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HEREDITARY DISTURBANCES OF ENAMEL FORMATION AND CALCIFICATION*

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Discoloration of the teeth as a family trait is fairly rare. Clinical studies reveal that such discoloration is caused by anomalies in dental structure. One specific condition that has been studied both clinically and histologically has been called dentinogenesis imperfecta hereditaria. Hereditary discoloration of teeth caused by anomalies of the enamel has not heretofore been understood in its histology and pathogenesis. It is the purpose of this study to clarify these anomalies both clinically and histopathologically.

The investigations reported in this paper revealed that these hereditary anomalies of the enamel are not homogeneous. In one type of amelogenesis imperfecta hereditaria, a thin layer of fairly normal enamel is produced; in the other, a normal amount of enamel is formed, but the enamel does not fully calcify. The first, quantitative defective process of the enamel can be termed hereditary enamel hypoplasia; the second, qualitative, hereditary enamel hypocalcification.

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*Honorable mention, Fourth Annual Prize Essay Competition, Chicago Dental Society.

REVIEW OF THE LITERATURE

Finn[1] reviewed the literature on cases of hereditary discoloration of teeth up to 1938. He differentiated two groups of anomalies, based on the often scanty clinical description. He classified one group as hereditary brown opalescent dentin; the second as brown hypoplasia of the enamel. Finn found that of forty-one cases reviewed, twenty-eight could probably be identified as opalescent dentin and only three as brown hypoplasia of the enamel. Ten cases remained unclassified because of lack of information on differential characteristics.

Dentinogenesis Imperfecta.—The clinical characteristics and the pathogenesis of the first group of hereditary discoloration anomalies of teeth have been reviewed by Finn[1] and Roberts and Schour.[2] The condition is known as hereditary opalescence of dentin, hereditary odontogenesis imperfecta[3] or dentinogenesis imperfecta.[2] The last seems the most appropriate term for this condition. The teeth in cases of dentinogenesis imperfecta are dark bluish gray. The crowns are of normal size and are covered with smooth enamel of normal thickness. The pulp chamber is reduced in size or entirely absent.[2, 4, 5] Various investigators have reported that the roots are small in proportion to the crowns.[2, 5, 6] The first histologic description of teeth showing dentinogenesis imperfecta hereditaria was furnished by K. H. Bauer,[7] who studied the tooth germs of a child afflicted with osteogenesis imperfecta. The primary disturbances are found to be in the dentin.[2, 5] The development and structure of the enamel is normal.[2, 5, 7, 8, 9, 10] The dentin is characterized by an irregular arrangement and decrease in number of dentinal tubuli, cellular inclusions and incomplete and irregular calcification.[2, 5, 7, 8, 9] The odontoblasts are reduced in number, which accounts for the decrease in the number of dentinal tubuli. The microhardness of the dentin is very low. The dentin shows a low inorganic content and a high content of water.[5, 10]

Dentinogenesis imperfecta hereditaria is a dominant mendelian character theoretically transmitted by the affected individuals to only half of their children.[2, 5, 11]

Amelogenesis Imperfecta.—In contrast to the first group of hereditary discoloration anomalies, there are no histologic and chemical investigations available in the case of the second group, usually referred to as hereditary brown opalescent teeth[12] or brown hypoplastic enamel.[1] The few interpretations of the pathologic nature of the disorder are based solely on clinical observations.

Spokes[13] described a case of hereditary brown teeth and recorded the following conclusions:

> In ordinary cases of defective enamel we are accustomed to see transverse grooves across the teeth marking the period at which something occurred to interfere with the due formation of this tissue, but in the present case there are grooves in the long axis of the tooth showing that the process was modified throughout the whole of the time occupied by calcification. In some places there

1. Finn, S. B.: Hereditary Opalescent Dentin. I. Analysis of Literature on Hereditary Anomalies of Tooth Color. J.A.D.A., 25:1240, August 1938.

2. Roberts, E., and Schour, Isaac: Hereditary Opalescent Dentine (Dentinogenesis Imperfecta). Am. J. Orthodontics, 25:267, March 1939.

3. Becks, Hermann: Histological Study of Tooth Structure in Osteogenesis Imperfecta. D. Cosmos, 73:437, May 1931.

4. Wilson, G. W., and Steinbrecher, Matilda: Hereditary Hypoplasia of Dentin. J. A. D. A., 16:866, May 1929.

5. Skillen, W. G.: Histologic and Clinical Study of Hereditary Opalescent Dentin. J. A. D. A., 24:1426, September 1937.

6. Hodge, H. C., et al.: Hereditary Opalescent Dentin. II. General and Oral Clinical Studies. J. A. D. A., 26:1663, October 1939.

7. Bauer, K. H.: Ueber Osteogenesis Imperfecta. Deutsche Ztschr. f. Chir., 154:166, 1920.

8. Biebl, M.: Beitrag zur Frage der Osteogenesis Imperfecta. Virchow's Arch., 255:54, 1925.

9. Euler, Hans, and Meyer, Wilhelm: Pathologie der Zaehne Muenchen, 1927, p. 19.

10. Hodge, H. C., et al.: Hereditary Opalescent Dentin. III. Histological, Chemical and Physical Studies. J. D. Res., 19:521, October 1940.

11. Noyes, F. B.: Hereditary Anomaly in Structure of Dentin. J. D. Res., 15:154, June 1934.

12. Thoma, K. H.: Oral Pathology. St. Louis: C. V. Mosby Co., 1941.

13. Spokes, S. C.: Case of Faulty Enamel. Brit. J. D. Sc., 33:750, 1890.

is a total absence of enamel, and the exposed surface of dentine seems to have been sufficiently hard to survive without the protection of the usual covering. In other places the enamel is laid on in regular masses. Both temporary and permanent teeth are brown. They are not so bad when first erupted, but seem to become worse with age.

Colyer and Sprawson[14] classified this case as one of hereditary hypoplasia.

Bampton[15] reported two families in which dental pigmentation occurred. He described the appearance of enamel as follows: "The enamel is not very dense, not soft and yet not quite normal—and has a dull appearance, being rather rough and inclined to be pitted."

Willett[16] reported a case in which the deciduous and permanent teeth were devoid of enamel. The condition could be traced through three generations. Bodecker[17] interpreted Willett's case as an "epithelial disturbance which interfered with the proper enamel development, transmitted to the children by the great-great-grandmother." Finn[1] classified the same case as hereditary opalescence of dentin.

Friedberg[18] reported complete absence of enamel in the deciduous and the permanent teeth of two sisters; whereas, in the same family, the teeth of two brothers and the parents were of normal shape and color. Staz[19] recently reported a case in which the enamel "matrix seemed to be laid down in normal manner," whereas there was "some variation in the process of calcification."

Finn[1] concluded that brown hypoplasia of the enamel is characterized by a discoloration of the teeth, a decrease in translucency and hypoplasia of the enamel; that the roots, pulp canals and pulp chambers are normal, and that the teeth are resistant to attrition and show a variable susceptibility to caries. According to Finn, the anomaly is sex linked and "heterozygous dominant." Thoma[12] stated that "nothing is known regarding the etiology of hereditary brown opalescent teeth." He suggested that the condition may be identical with or closely related to hereditary dentinogenesis imperfecta.

MATERIAL

The teeth of three families, D, M and L, which were affected by amelogenesis imperfecta hereditaria, were examined clinically and roentgenographically. Fifty-three teeth were extracted and studied histologically. (Table 1.)

Family D.—Four members of the family with brown teeth were treated by A. A. Giraldi, of Chicago, in 1940. Other members of the same family came to the clinic of the Chicago College of Dental Surgery. Dr. Giraldi cooperated with us by permitting a complete investigation of the cases and sending to us the extracted teeth. Eleven members of the family were studied clinically and roentgenographically. Of this number, two were normal and nine had brown teeth. The teeth of three of the affected members were studied histologically. (Table 1.)

Family M.—Two members, the mother and a daughter, were examined clinically and roentgenographically. Several of the mother's teeth had to be extracted and were studied histologically and chemically. (Table 1.)

Family L.—Early in 1938, a staff den-

14. Colyer, J. F., and Sprawson, Evelyn: Dental Surgery and Pathology. New York: Longsman, Green and Co., 1931.

15. Bampton, E. H.: Case of Hereditary Dental Pigmentation. Tr. 6th Internat. D. Cong., London, 1914, p. 167.

16. Willett, R. C.: Unusual Infant Diet and Questionable Effect upon Dentition. Internat. J. Orthodontia, 20:432, May 1934.

17. Bodecker, C. F.: Discussion of Willett, Reference 16.

18. Friedberg, Herman: Die Hypoplasie des Schmelses in makroskopischer und mikroskopischer Darstellung. Vierteljahrssch. f. Zahnheilk., 36:214, 1938.

19. Staz, T.: Hereditary Hypoplasia of Enamel. S. Afr. D. J., 16:223, June 1942.

tal hygienist of the Maine Bureau of Health reported some cases of peculiarly discolored teeth in a few children in a rural school in southern Maine. Preliminary investigation showed that these children were members of one family who had lived in two rural areas and had secured their water supply from two shallow wells. A tentative diagnosis of mottled enamel was established, but epidemiologic studies did not confirm the diagnosis. Repeated analysis of the drinking water showed only minute traces of fluorine. Four of the children were given complete physical examinations by the staff of the U. S. Marine Hospital at Portland, Maine. The teeth of seven members of the family were examined clinically and roentgenograms of four of these patients were made available. A few teeth of three members were studied histologically. (Table 1.)

HEREDITARY ENAMEL HYPOPLASIA

Family D.—Genetic analysis: The family is of Italian origin, with a great number of relatives still living in Italy, so that the family history is incomplete. The available data prove that the anomaly is hereditary, being traced to a male member who had ten children. (Fig. 1.) Five of the children were affected and three of these transmitted the anomaly to some of their children. All children of the nonaffected members were free of the condition. In all, eleven members of the family had the disease, and eleven siblings were not affected. The fact that the defect did not appear in the children unless it was present in one of the parents

TABLE 1.—TEETH EXAMINED HISTOLOGICALLY

Family and Pedigree No.	Erupted Teeth		Unerupted Teeth	
Family D, II—9	6 / 2·	/ 3	87	/ 8
Family D, III—18	6 4III21 / 543	1 III45 / 123 5	9 7	3 678
Family D, III—21	/ 54III2	III /	21 / 87	/
Family M, II—6	7 / 543	678 / 345	3	/
Family L, V—16	1 /	1 /	/	/
Family L, V—15	/ IV	/	/	/
Family L, V—9	/	/	/	/
Total number of teeth studied	38	53	15	

indicates that the condition is in all probability a mendelian dominant character. The observed ratio of normal to defective members in this family, 11:11, is consonant with the theoretically expected ratio. The affected members are heterozygotes. No sex linkage is apparent.

Two of the investigated members (III-21, III-24)* showed congenital absence of certain teeth. One (III-17) had a supernumerary lower left bicuspid. Family members reported that one female member (III-5) living in Italy who is now 16 years old "never got any teeth." It is difficult to determine whether the lack of teeth in this case is due to a disturbance of early development or to a total arrest of eruption.

Gross analysis: The most striking features of the dentition were the color and shape of the teeth. The deciduous and the permanent teeth presented the same appearance. (Fig. 2.) The teeth were yellowish brown, the upper teeth darker than the lower. The surface of the teeth was smooth. The buccal and lingual surfaces were glossy and were found to be hard on probing with an explorer. The proximal surfaces were dull and of chalky consistency. The crowns of the teeth were shaped as if they had been prepared for jacket crowns. (Fig. 2.) The buccal surface was flat, the bulge, which should form the contact point, being absent.

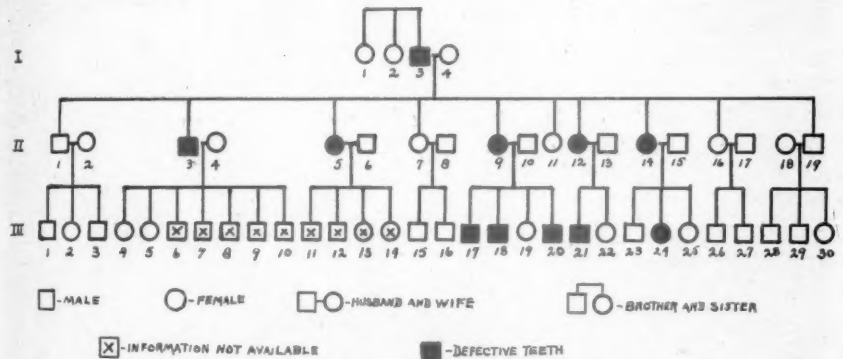

Fig. 1.—Hereditary enamel hypoplasia in Family D.

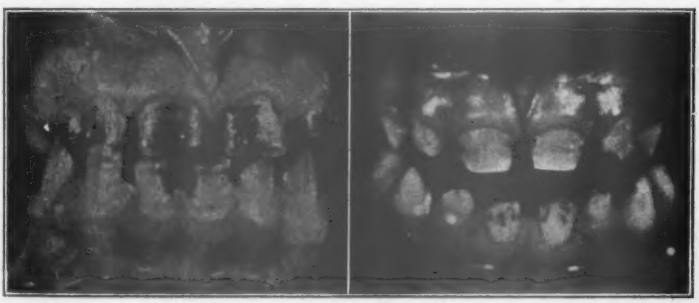

Fig. 2.—Teeth of two members of Family D. Left, teeth of III-18; showing proximal surfaces of permanent teeth parallel. Right, teeth of 4-year-old son of III-20; showing similarity in appearance to permanent teeth shown at left.

*Roman numerals indicate the generation; arabic numerals the individual in each generation according to pedigree figures.

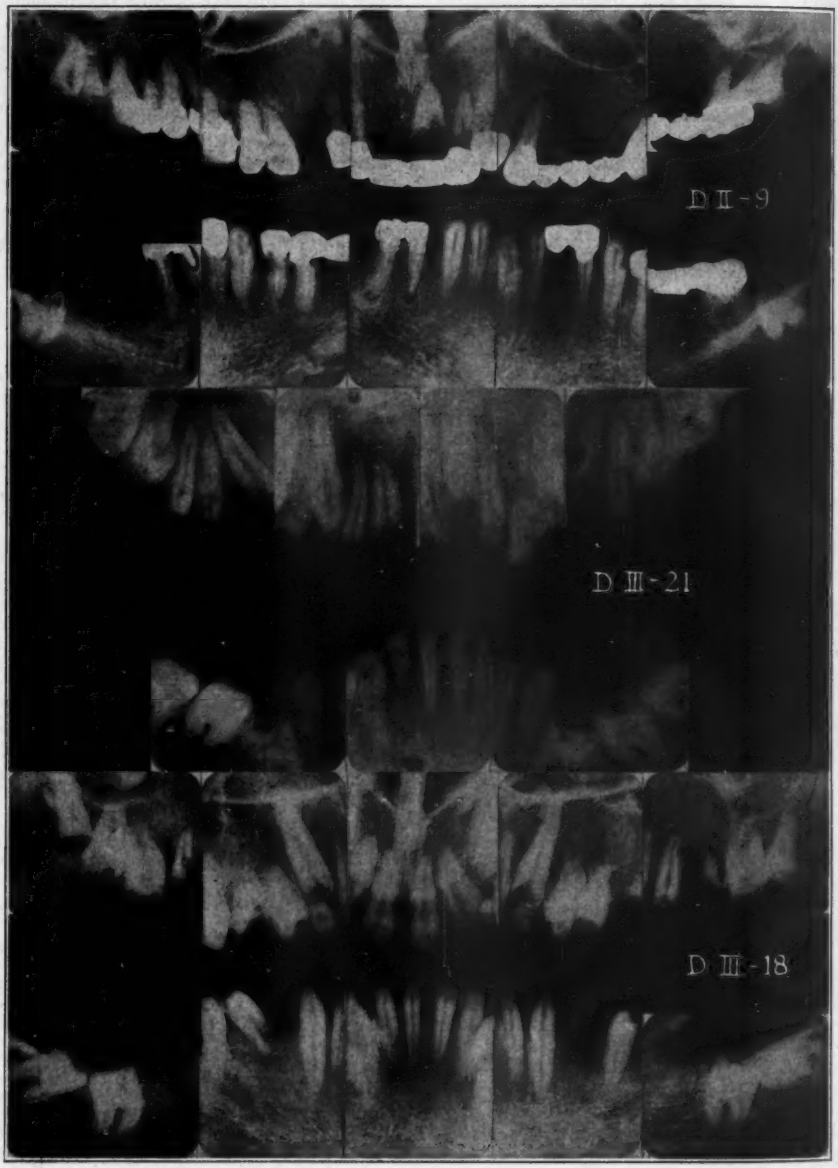

Fig. 3.—Roentgenograms of dentition of three members of Family D; showing lack of enamel; multiple impaction of teeth, and resorption of crowns.

The diameter of the incisors at the cervix was about the same as at the incisal edge. The cuspids were cone-shaped. The bicuspids and molars were almost cylindrical. In several instances, the anatomic details of the occlusal surface had been lost by attrition. The teeth were separated by large diastemas even in a case (III-20) in which most of the teeth had erupted.

All nine members of the family studied showed arrested eruption of a varying number of teeth. (Table 2.) The teeth most frequently embedded were the second and third molars in both jaws, followed by the upper cuspids. The unerupted teeth, except some third molars, showed irregular defects of the occlusal part of the crowns. The roentgenographic density of these areas cor-

TABLE 2.—ROENTGENOGRAPHIC FINDINGS IN EIGHT MEMBERS OF FAMILY D, AFFECTED WITH HEREDITARY ENAMEL HYPOPLASIA

Number of the Member	Age	Erupted Teeth	Embedded Teeth	Number of Embedded Teeth	Resorption of Crowns	Congenital Variation in Number of Teeth
II—12	44	?	87 3 | 7 87 32 | 78	10	7 3 | 7 21 | 7	
II—14	42	54 1 | 1 5 21 | 1 5	7 | 3 678 7 | 8	7	7 | 3 67 7 |	
II—9	41	654 2 | 23 7 54321 | 2345 7	87 | 1 8 8 | 8	6	87 1 | 8 | 8	
III—17	22	54 21 | 12 45 321 | 12 45	76 3 | 78 87 54 | 5 7	11	3 | 54 | 5	Supernumerary | 5
III—18	20	654III21 | 12III45 54 321 | 12 3 5	987 3 | 3 678 87 | 78	12	7 3 | 3 7 87 | 78	
III—20	17	654 3 21 | 123 4 56 654 3 21 | 1234567	87 | 78 87 |	6	7 | 7 7 |	
III—21	16	54 | III45 54III21 | 1 3 45	876 321 | 123 678 876 | 678	18	6 | 123 6 6 | 67	Missing | — 3 | 2
III—24	16	6 21 | 123 4 56 654 3 21 | 123 4 56	87 | 34 78 87 | 78	10	| |	Missing | — 5 |

Roentgenographic analysis: The permanent and deciduous erupted, as well as unerupted, teeth presented essentially the same characteristics. (Fig. 3.) The proximal surfaces were more or less parallel instead of diverging. The normal bulge of the crown was missing. In the roentgenograms, erupted as well unerupted teeth seemed to lack enamel.

responded to that of the surrounding bone, which had replaced the partly resorbed dental tissues of the crowns. Some embedded teeth lacked almost the entire crown. Most of the unerupted teeth were in a normal preeruptive position and their long axis was at a right angle to the occlusal plane. This held true, in many instances, even for the third molars, which had moved from the

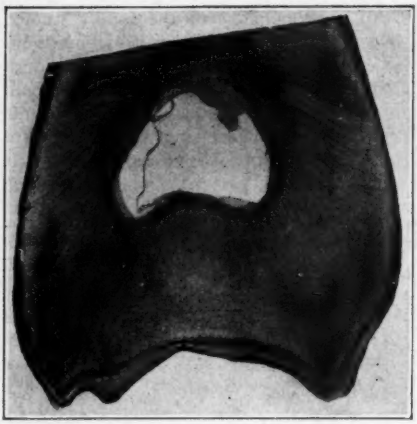

Fig. 4.—Ground section of upper right first molar from patient (III-18) with hereditary enamel hypoplasia. The dentin is of normal structure. The thickness of the enamel is greatly reduced.

primary horizontal plane to a straight position. It must be emphasized that the roots and pulp chambers were of average size and shape. The dentin was of normal radiopacity.

Histologic analysis: Ground and decalcified sections of erupted and unerupted teeth were examined. (Table 1.) Some of the teeth had been removed surgically with the overlying tissues. The primary anomaly was entirely restricted to the enamel. Pulp, dentin and cementum were, without exception, normal in structure. The dentino-enamel junction showed the normal scalloped outline. Ground sections revealed that the crown was covered by enamel, which was reduced in thickness to about one-eighth of the normal. (Fig. 4.)

The ground sections revealed the presence of the normal structural elements of the enamel. Decalcified sections showed remnants of organic substance, not fully matured enamel matrix, in greater volume than normally.

The enamel was covered by primary and secondary cuticle. In addition, a thin layer of acellular cementum continued from the root over the crown on the entire circumference, extending, in some teeth, to the occlusal plane. (Fig. 5.) Whether the occlusal surface itself was covered by cementum could not be ascertained on the erupted teeth because of resorption, attrition or destruction by caries. Many of the erupted teeth showed more or less far-reaching resorption of the incisal or occlusal parts of the crowns.

The crowns of all embedded teeth were deeply destroyed by resorption with the exception of an upper third molar, where resorption had just begun. Resorption started in all instances in that part of the crown adjacent to the oral epithelium; i.e., on the incisal edge or the occlusal surface. Resorption by osteoclasts destroyed enamel as well as dentin and formed irregular branching cavities which were filled with connective tissue. (Fig. 5.) The resorption only rarely opened the pulp chamber. Even in cases in which resorption proceeded to a level apically from the pulpal roof (Fig. 5), the pulp chamber was still protected by a thin wall of predentin. Bone formation occurred in the connective tissue invading the tooth. As a rule, the newly formed bone had no connection with the alveolar bone.

The alveolar bone was of normal appearance. It seemed to be significant that the bone changes normally associated with eruptive movements of the teeth were present in the alveolar bone of the embedded teeth. At the site of embedded teeth, the alveolar ridge was heightened and bulged into the oral cavity.

The periodontal membrane of the embedded teeth consisted of dense connective tissue, which did not show a functional arrangement of its fibers. Epithelial rests were numerous. Many showed degenerative changes and consecutive calcification. Globular bodies of calcium salts sometimes fused to form irregular concrements. (Fig. 6.)

Between secondary cuticle and cementum, a thin layer could be traced around the whole circumference of the crown. This layer stained deep blue in hematoxylin-eosin and red in Mallory stain. It could be easily differentiated from the yellow hornified secondary cuticle and from the covering cementum. The peripheral boundary of this layer was often irregular. In one third molar presenting practically no signs of resorption, it was evident that the cementum did not continue to the occlusal surface of the tooth.

Diagnosis: The case of Family D is char-

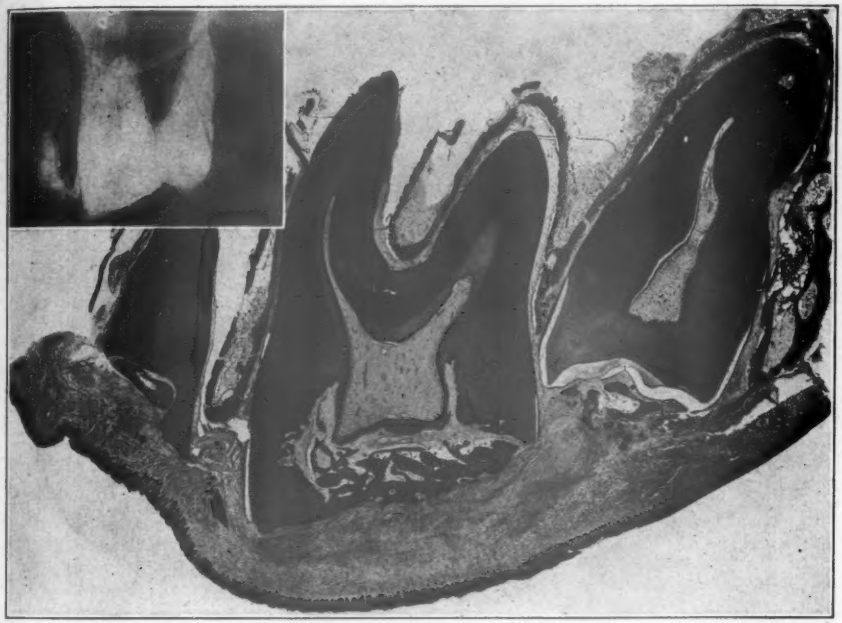

Fig. 5.—Photomicrograph and roentgenogram of upper left molar region of case III-18; showing root remnant of first molar; far advanced resorption of crown of second molar; beginning resorption of third molar, and bulging of area of second molar into oral cavity. (Family D.)

acterized by a primary deficiency in the amount of enamel, which can be designated as hereditary enamel hypoplasia. The resorption of crowns and the embedding of numerous teeth were secondary features.

HEREDITARY ENAMEL HYPOCALCIFICATION

Family M.—Genetic analysis: A mother, 29 years old, and her daughter of 9 years, presented themselves in the clinic because of the brown discoloration of their teeth. Both were born and reared in Chicago and enjoyed good health. The anomaly could be traced back to the child's maternal grandmother. A pedigree of the three generations is shown in Figure 7. No far-reaching genetic conclusion can be drawn from this limited material.

Gross analysis: The teeth of the mother (II-6) were dark brown, their surfaces dull and rough. Bicuspids and molars lacked the normal bulge of the crown and were almost cylindrical. The greater part of the crown seemed to have lost the enamel covering. (Fig. 8.) Only a small band of enamel was found in the cervical region. The enamel at the labial surfaces was dull and could be removed easily with a sharp instrument. At the lingual surface of the lower anterior teeth, the enamel was harder and slightly glossy.

The teeth of the daughter (III-2), deciduous as well as permanent, were not so dark a brown as those of the mother. The lower teeth were lighter than the upper and their surfaces were dull and rough. The permanent upper central incisors and the first molars were denuded of enamel to the level of the free margin of the gingiva. (Fig. 8, below.) The deciduous teeth and the permanent lower anterior teeth lost the enamel on only the incisal half of the crowns. The

Fig. 6.—High magnification of interdental space between second and third molars (Fig. 5); showing epithelial rests proliferated, degenerated and calcified, forming conglomerates. (Family D.)

remaining enamel on the gingival part of the crowns was fairly smooth, but dull. It could be chipped off easily. Eruption was retarded, as evidenced by the fact that the upper lateral incisors were not yet replaced in a child 9 years old. (Table 3.)

Roentgenographic analysis: Patient II-6 (Fig. 9): The outline of the crowns showed irregularities corresponding to the defects of the enamel. In the cervical area and at the proximal surfaces of the lower anterior teeth, remnants of the enamel could be recognized. The enamel was of almost the same radiopacity as the dentin. Caries could be seen

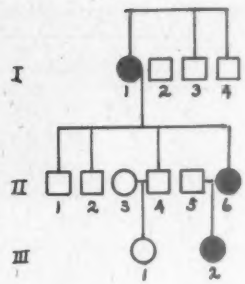

Fig. 7.—Hereditary enamel hypocalcification in Family M. The symbols are as in Figure 1.

in a number of teeth. The roots and pulp cavities seemed to be normal.

The upper right cuspid was embedded in a horizontal position. The occlusal part of the crown had been resorbed and replaced by bone.

The enamel could not be differentiated from the dentin. Its presence could be assumed by the normal bulging of the crown. The pericoronal space was slightly widened.

Patient III-2 (Fig. 9): The erupted teeth of the child gave, in the roentgenograms, a picture conforming to the clinical findings. In the cervical part, the outline of the crown revealed the presence of enamel, although there was no difference in radiopacity in enamel and dentin. The incisal or occlusal part of the crown was narrower than the cervical part.

The crowns of the unerupted teeth were of normal shape throughout. The enamel could not be differentiated from the dentin. The shape and length of the roots and the shape and width of the pulp cavity corresponded to the age level.

Histologic analysis: Ground sections and decalcified sections of erupted teeth showed that the enamel was missing in large areas of the crown.

Wherever enamel was present, it was of normal thickness. The boundaries of the enamel appeared as sharp, irregular, breaking lines. There was no doubt that the missing enamel had been broken away either *in vivo* or during manipulation in the preparation of the specimen. The structure of the enamel was normal.

On decalcified sections, the reason for the softness and dullness of the enamel, and its loss on a large part of the crown, became apparent. The enamel was insoluble in 10 per cent nitric acid. The enamel, therefore, was not fully matured, but was in its matrix stage.

Chemical investigation proved that the organic contents of the enamel were considerably higher than the normal and the mineral contents were proportionately lower. Pulp, dentin and cementum of all investigated teeth proved to be of normal structure.

The embedded upper cuspid (Fig. 10) was removed with its surrounding connective tissue. The crown was partly resorbed and replaced by loose connective tissue and bone. The resorption started at the tip of the crown. The connective tissue on the crown

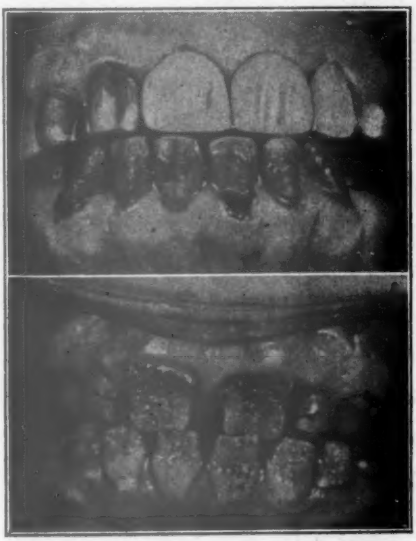

Fig. 8.—Teeth of two members of Family M. Above, teeth of II-6, aged 29. The lower teeth were dark brown, dull and rough. There was bridgework on the upper teeth. Below, teeth of III-2, aged 9. The upper teeth were darker brown than the lower. The incisal half of the crowns was denuded of enamel.

TABLE 3.—CLINICAL AND ROENTGENOGRAPHIC FINDINGS IN TWO MEMBERS OF FAMILY M

Member	Age	Erupted Teeth		Unerupted Teeth		Fillings or Cavities	
II—6	29	7 4 / 8 54 3 2 1	2 3 678 / 1 2 3 4 5	3		67 / 5 4 3	4 5
III—2	9	6 V IV III II 1 / 6 V IV III 2 1	1 II III IV V 6 / 1 2 III IV V 6	7 5432 / 7 543	2345 7 / 345 7	6 V IV 1 / V IV	1 II V / IV V

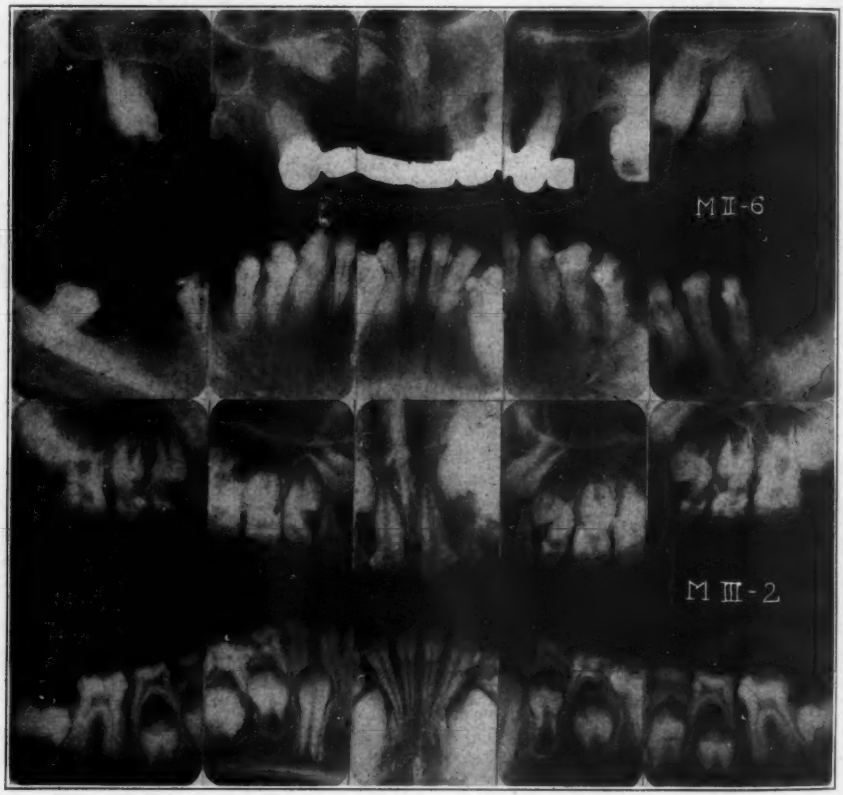

Fig. 9.—Roentgenograms of members of Family M referred to in Figure 8. Above, roentgenograms of dentition of II-6; showing irregular outline of crowns. In the cervical area, the enamel was of almost the same radiopacity as the dentin. The right upper cuspid was impacted in a horizontal position. The crown was partly resorbed. Below, roentgenograms of dentition of III-2; showing defective enamel of erupted teeth, deciduous as well as permanent. The shape of the unerupted teeth was normal. Enamel and dentin were similar in radiopacity.

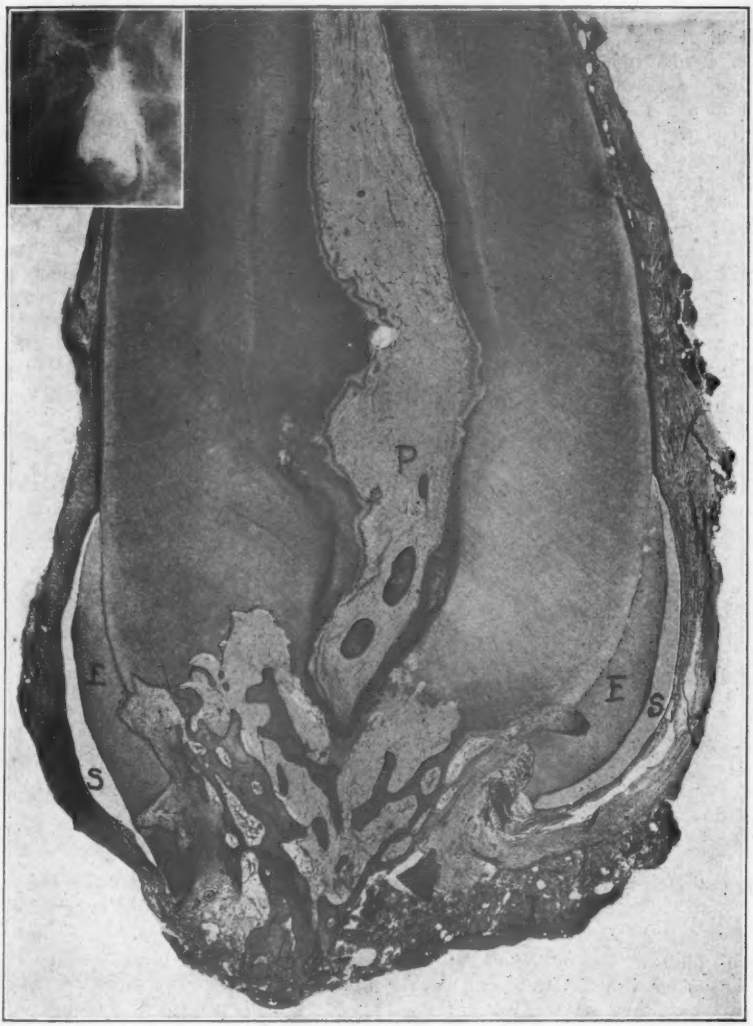

Fig. 10.—Photomicrograph and roentgenogram of impacted upper right cuspid of II-6, member of Family M, affected with hereditary enamel hypocalcification. A large part of the crown was resorbed and replaced by bone and bone marrow. Resorption probably started from the area of inflammation *(I)*. *E*, enamel matrix, acid insoluble and of normal thickness. S, space due to shrinkage during preparation of specimen. P, pulp with pulp stone.

showed signs of chronic inflammation. The enamel of the embedded cuspid was of normal thickness and structure. It was acid insoluble and covered by primary cuticle as well as a layer of flat epithelial cells. These cells were the reduced enamel epithelium. In some areas, a homogeneous layer was interposed between cuticle and reduced enamel epithelium.

Diagnosis: The case of Family M is

characterized by a primary deficiency in calcification of the enamel. The enamel was of normal thickness. The case can, therefore, be designated as hereditary hypocalcification of the enamel. The loss of the enamel of the erupted teeth was secondary. The finding of an embedded and partly resorbed upper cuspid was incidental.

Family L.—Genetic analysis: The anomaly could be traced through six generations back to a man born in 1805 whose parents immigrated from England. He had six children who had brown teeth. (Fig. 11.) His second daughter transmitted the anomaly to two children. The older of these two had a daughter with "brown" teeth, and she had twelve children, seven of whom showed severe anomalies of the teeth. In all, eighteen descendants of the family apparently had the anomaly, as compared with twenty-three members with normal teeth. In no instance was the anomaly inherited from a normal member. The affected members are described as having teeth that were dark brown and without enamel. Some of them lost the teeth at an early age, principally because of the disfiguration.

Epidemiologic investigation: The oral cavities of eighteen children from the school that the affected children attended were examined. One child showed pits on the deciduous molars and one had a white opaque spot on the labial surface of the upper left central incisor. All other children, even those who used drinking water from the same well as the affected family, were found to be normal.

Repeated examination of water supplies (Table 4) used by the affected members showed a maximum content of 0.25 part per million of fluorine. This amount is expected to produce, in a very low percentage (15 per cent), white opaque spots.[20] Experiments on rats given varying concentrations of the water from the suspected well (fluorine content at this time 0.1 part per million) were negative.

Physical examination: Physical examination of four children of the affected family (V-13, V-14, V-15, V-16, Fig. 11) included: weight, height, skin, eyes, ears, nose, throat, heart, lungs, abdomen, reflexes, coordination,

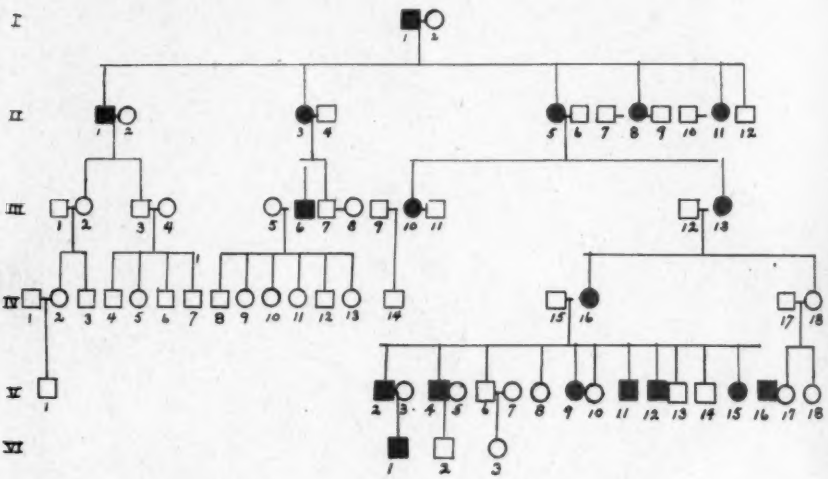

Fig. 11.—Hereditary enamel hypocalcification in Family L. The symbols are as in Figure 1.

20. Dean, H. T.: Investigation of Physiological Effects by Epidemiological Method; in Fluorine and Dental Health. American Association for the Advancement of Science, Washington, D. C., 1942.

blood and urine. All of the children examined were found to be in apparently good physical condition with the exception of possibly slight anemia (V-13) and underweight (V-16).

The teeth of seven children of this family were examined. (Table 5.) The erupted teeth of two children (V-13 and V-14) were of fairly normal shape. Only a few teeth showed a slight pitting of the enamel. Most of the teeth were chalky white. Roentgenograms showed no significant changes.

Gross analysis: The clinical pictures of the dentition of five children (V-11, V-12, V-15, V-16, VI-1) were so similar that the individual records can easily be summarized in a comprehensive description. (Table 5.)

Deciduous and permanent teeth were affected alike and no tooth was found to be normal, although the degree of destruction varied. Most of the teeth were cylindrical or cone-shaped and showed confluent pitting or complete loss of enamel. (Fig. 12.) The labial surface was often more severely affected than the lingual. In most instances, the denudation extended to the level of the free margin of the gingiva. In some cases, more of the cervical region was covered by a collar of soft enamel. The teeth were brown with a yellowish hue. The less affected teeth were brown with lighter yellow areas and had a mottled appearance. The enamel had the consistency of chalk. The defects could be observed even on teeth that had only recently erupted. In many cases, abrasion was markedly increased.

Eruption of the teeth appeared to be within the range of normal variation in two cases, accelerated in one and slightly retarded in two. In some of the cases, the gingiva was slightly inflamed and hypertrophic. Otherwise, the mucous membrane was in good condition.

Roentgenographic analysis: Roentgenograms (Fig. 13) of two children (V-15 and V-16) show that many of the erupted teeth had lost some of the enamel covering. In these areas, the outline of the crowns was irregular. Where enamel was still present, as for instance in the cervical region of the crown, the contour of the crown was normal, but no differentiation could be made between dentin and enamel. The unerupted teeth had normally shaped crowns. However, the

TABLE 4.—WATER ANALYSIS FOR FLUORINE*

	10/30/38	12/9/38	1/12/39	2/18/39	6/8/39
Well L	0	†	0		
Spring L	†	†	0	0.10	0.10
Well D	0.25	0.10	0	0.15	0.13

*Parts per million. †0.05 parts per million or less.

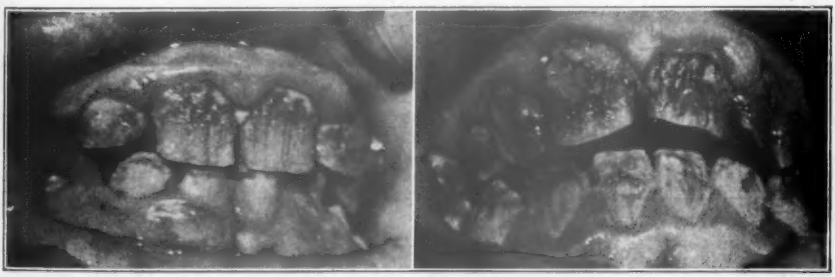

Fig. 12.—Teeth of two members of Family L: Left, V-15; right, V-12; showing partial loss of enamel and discoloration of teeth.

TABLE 5.—CLINICAL AND ROENTGENOGRAPHIC FINDINGS IN FAMILY L

Member	Age	Erupted Teeth	Unerupted Teeth
V—16	7	6 V IV III II I | II III IV V 6 6 V IV III 2 1 | 1 II III IV V 6	7 54321 | 12345 7 7 543 | 2345 7
V—15	9	6 5 4 2 1 | 1 2 4 V 6 6 V 4 3 2 1 | 1 2 3 4 V 6	7 3 | 3 7 87 5 | 78
V-14	11	6 V IV III 2 1 | 1 2 III IV V 6 6 5 4 3 2 1 | 1 2 3 4 5 6	7 543 | 345 7 7 | 7
V-13	13	6 V 4 3 2 1 | 1 2 3 4 V 6 6 V 4 3 2 1 | 1 2 3 4 6 7	87 5 | 5 78 7 5 | 8
V-12	15	6 5 4 III 2 1 | 1 2 III 4 5 6 7 7 6 5 4 3 2 1 | 1 2 3 4 5 6 7	?
V-11	17	6 V IV III 2 1 | 1 2 III V 6 7 6 4 III 2 1 | 1 2 3 4 6 7	?
VI—1	2	IV III II I | I II III IV IV III II I | I II III IV	?

density of dentin and enamel was almost the same. The pulp cavities were of normal size and shape, and the development of the root corresponded to the age of the children. In one of the children (V-15), the lower left second bicuspid was congenitally missing. The roots of the second deciduous molar were almost entirely resorbed.

Histologic analysis: Ground sections and decalcified sections of teeth were studied. Pulp, dentin and cementum proved to be entirely of normal structure. The enamel was missing in wide areas. The remnants of enamel were of normal thickness and of normal structure. The calcification of the enamel had not reached the normal degree; therefore, the enamel remained in the acid insoluble state. In other words, the enamel was still in transition between enamel matrix and fully mature enamel. Primary and secondary cuticle were present in the areas where the enamel surface remained intact. There was no cementum on the enamel surface.

Diagnosis: The case of Family L is characterized by primary deficiency in calcification of the enamel. The enamel was of normal thickness. The condition can therefore be designated as hereditary hypocalcification of the enamel. The loss of the enamel of the erupted teeth was secondary. The finding that a lower bicuspid was congenitally missing in two of the children was incidental. The anomaly was not of the same degree in all the children affected. In one group, hypocalcification seemed to be only very slight, resulting in a chalky appearance of the enamel.

TABLE 5.—CLINICAL AND ROENTGENOGRAPHIC FINDINGS IN FAMILY L (Cont.)

Teeth Showing Fillings or Caries	Clinical Appearance	Roentgenographic Findings
III | 6 V IV III | III IV 6	Light yellowish brown; severe confluent pitting; eruption normal	Erupted teeth: irregularly outlined radiolucent area occlusally; gingival portion normal outline; unerupted teeth: normal shape; enamel and dentin homogeneous; root and pulp normal (Fig. 13, left)
6 | V6 | V	Light yellow to light brown; some teeth cone-shaped and denuded of enamel; others with confluent pitting; eruption accelerated (Fig. 12, left)	Erupted teeth. Irregularly outlined radiolucent area occlusally; gingival portion normal outline; unerupted teeth: normal shape; enamel and dentin homogeneous; root and pulp normal; $\overline{5}$ missing (Fig. 13, right)
6 V IV III | IV V6 6 | 6	Permanent teeth showing white chalky crown; normal shape; eruption normal	Clear differentiation between dentin and enamel; crowns, roots and pulps normal shape
V 1 | III V V |	White paper-like appearance to slight pitting; normal shape; eruption normal	Clear differentiation between dentin and enamel; crowns, roots and pulps normal shape; $\overline{5}$ missing
 6 3 | 7	Severe confluent pitting of enamel; cone-shaped; eruption slightly retarded (Fig. 12, right)	
V IV | V 76 | 6	Brownish with yellow tinge; confluent pitting; eruption slightly retarded	
None	Yellow cone-shaped teeth denuded of enamel except under free margin of gingivae; eruption normal	

DISCUSSION

Two Phases of Enamel Development and Two Types of Amelogenesis Imperfecta.—Clinical and histologic studies reveal that amelogenesis imperfecta hereditaria must be subdivided into two distinct pathologic entities. In hereditary enamel hypoplasia, fairly normal enamel is deposited in a subnormal amount. In hereditary enamel hypocalcification, enamel of normal thickness is formed, but remains immature and soft. These two types of disturbance of the enamel development can be readily correlated with the two phases in the normal enamel development, enamel matrix formation and enamel maturation.[4, 21]

During the first phase of enamel development, the characteristic shape of the crown is determined by incremental apposition of enamel matrix, layer upon layer, from the dentino-enamel junction toward the surface. (Fig. 14 *A* to *D*.) The enamel matrix consists of 65 per cent organic material and water and only about 35 per cent mineral salts.[22] There-

21. Diamond, Moses, and Weinmann, J. P.: Enamel of Human Teeth. New York: Columbia University Press, 1940.

22. Weinmann, J. P.; Wessinger, G. D., and Reed, G.: Correlation of Chemical and Histological Investigations on Developing Enamel. J. D. Res., 21:171, April 1942. Developmental Disturbances of Enamel. Bur, 43:20, April 1943.

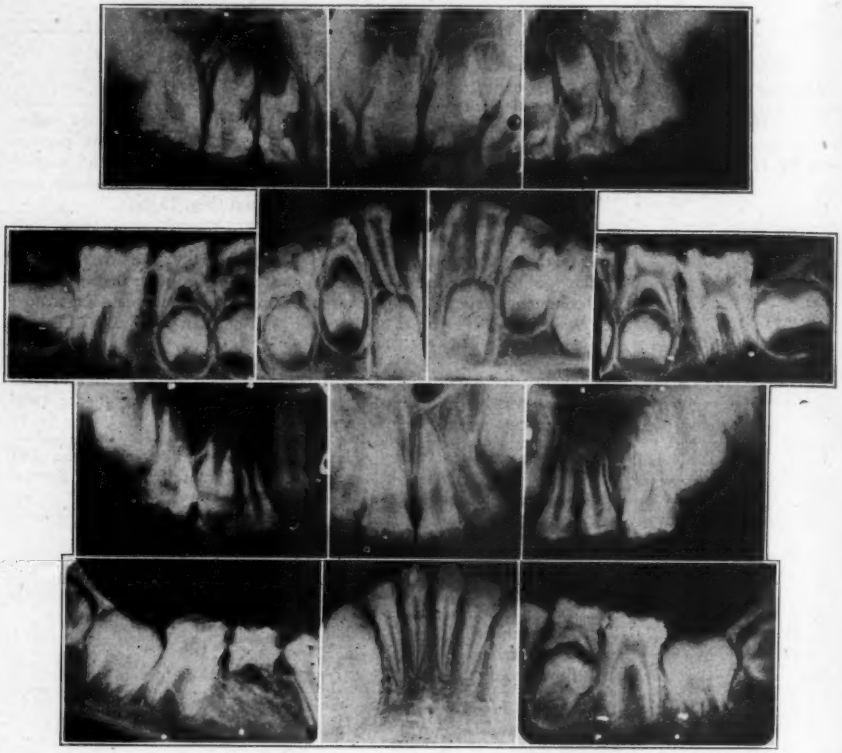

Fig. 13.—Dentition of two members of Family L: Above, V-16; below, V-15. The erupted teeth were irregular, the unerupted teeth, normal in shape.

fore, the enamel matrix has the consistency of cartilage, is even less radiopaque than dentin and is not soluble in acid.

During the second phase of enamel development, the organic material and water are removed almost completely and are replaced by mineral salts. Maturation begins only when the enamel matrix has reached full thickness in the occlusal parts of the crown. It starts at the tip of the cusp or the incisal edge and proceeds toward the cervix in cross relation to the incremental lines. (Fig. 14 *E* to *H*.) The mature enamel contains about 96 per cent mineral salts and 4 per cent organic material and water. It is the hardest tissue in the body. It is more radiopaque than dentin and is soluble in 5 per cent nitric acid. In the enamel matrix, the calcium salts are in a colloidal state.[23] Maturation begins with the crystallization of the calcium salts as hexagonal apatite crystals. The removal of organic material and water and the influx of calcium salts proceed gradually until their normal ratio is established.

Developmental disturbances of the

23. Kitchin, P. C.: Some Observations on Enamel Development as Shown on Mandibular Incisor of White Rat. J. D. Res., 13:25, February 1933.

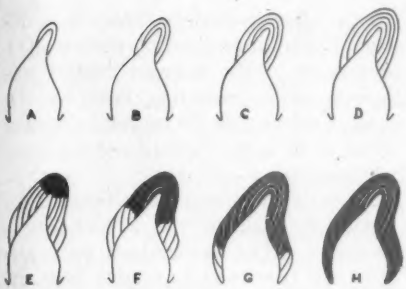

Fig. 14.—Diagrammatic representation of amelogenesis. *A-D*, formation of first layers of enamel matrix at top of cusp. Layers are deposited until the physiologic thickness of the enamel is reached in the occlusal region. *E-H*, maturation starting at top of crown, while additional layers of enamel matrix are deposited in the cervical third of the crown. Maturation progresses in cross relation to the incremental pattern of the enamel matrix. (Adapted from Diamond and Weinmann: Enamel of Human Teeth.)

enamel can evidently influence either one of the two phases of amelogenesis. A disturbance of the enamel matrix formation prevents the development of a normal amount of enamel. The thin layer of enamel matrix may undergo almost complete maturation. The result is a tooth covered by only a thin layer of hard and glossy enamel with a marked defect in the normal size and shape of the crown.

If the maturation of the enamel is affected, the normal amount of enamel matrix is laid down, but the final calcification of the enamel is interrupted at an early stage. The result is a tooth with a crown of normal size and shape covered by a soft enamel, which is chipped off very soon by the stress of mastication.

Table 6 summarizes the characteristic differences in hereditary enamel hypoplasia and hereditary enamel hypocalcification.

In both types of hereditary amelogenesis imperfecta, only the enamel is affected, pulp and dentin being normal. This allows a sharp distinction between amelogenesis imperfecta and dentinogenesis imperfecta; i.e., between the disturbances of ectodermal and mesodermal parts of the tooth.

Life Cycle of the Ameloblasts and the Pathogenesis of Amelogenesis Imperfecta.—Although we do not know the causes of hereditary malformations, we can form a fairly clear picture of the pathogenesis of the two types of hereditary amelogenesis imperfecta. The disturbance is, of course, one of the enamel forming organ. During the development of the tooth, the inner enamel epithelium performs a series of functions. It passes through the following stages: (1) morphogenetic, (2) organizing, (3) formative, (4) maturing and (5) protective.

In the morphogenetic stage, the inner epithelium models the morphologic shape of the crown (dentino-enamel junction). In the organizing stage, the cells of the inner enamel epithelium exert an influence on the adjacent connective tissue cells, inducing them to differentiate into odontoblasts. In the formative stage, which the ameloblasts reach only in the crown of the tooth, the cells of the inner enamel epithelium produce the enamel matrix. In the maturation stage, the ameloblasts take part in effecting the changes by which the enamel matrix is gradually transformed into ripe, fully calcified enamel. In the protective stage, the ameloblasts can no longer be differentiated from the other cells of the epithelial enamel organ and form with these cells the so-called reduced enamel epithelium. Its function is that of separating and protecting the mature enamel from the surrounding connective tissue until the tooth erupts.

The development of the enamel organ in the two types of amelogenesis imperfecta hereditaria is not disturbed before the third stage, the formative, has been reached. The morphogenetic determination of the dentino-enamel junc-

tion of crown as well as of root occurs normally. The differentiation of odontoblasts induced in organization of the epithelium is likewise undisturbed, so that normal dentin is formed. The difference in pathogenesis of hereditary enamel hypoplasia and hereditary enamel hypocalcification seems to lie in a difference in degree of damage to the enamel epithelium. This finds its expression also in a difference in the onset of the developmental disturbance. The injury is slighter in the case of enamel hypocalcification, more severe in the case of enamel hypoplasia. In the first case, the disturbance is mainly a functional one; in the second case, the disturbance is functional and organic.

In hereditary enamel hypocalcification, the ameloblasts function normally during the formative stage. Their function ceases in the early stages of maturation, so that the enamel remains in the matrix stage. The enamel organ then passes prematurely into the protective stage, but maintains its integrity until the tooth erupts. On the embedded cuspid of case II-6 of Family M (Fig. 10), the reduced enamel epithelium was present even at the age of 29 years. It was missing only in the occlusal part of the crown, where it had evidently been destroyed by an inflammatory process. The persistence of the reduced enamel epithelium as a protecting layer on the enamel safeguards the normal eruption of the teeth in the cases of enamel hypocalcification.

In hereditary enamel hypoplasia, the formative stage of the ameloblasts is shortened. The ameloblasts pass prematurely from the formative into the maturation stage. Thus, only a thin layer of enamel is laid down, which then undergoes fairly complete maturation. It can be assumed that a reduced enamel epithelium is formed. However, the epithelium degenerates soon, instead of forming a protective layer around the crown until the tooth erupts. Only remnants of the epithelium are sometimes seen, as epithelial rests in the cervical area of the crown, and these rests show all the signs of degeneration. The loss of the protective epithelial covering brings the connective tissue in contact with the enamel surface. Beginning at the cemento-enamel junction, a layer of cementum progresses occlusally, but generally does not reach the occlusal surface itself or the incisal edges. The cementum can be considered as a means

TABLE 6.—CHARACTERISTICS OF HEREDITARY ENAMEL HYPOPLASIA AND HYPOCALCIFICATION.

	Hereditary Hypoplasia	Hereditary Hypocalcification
Color of crown	Brownish yellow	Dark brown
Surface of crown	Smooth, glossy	Rough, dull
Consistency of enamel	Hard	Soft
Shape of unerupted tooth	Cone-shaped or cylindrical	Normal
Histology of enamel	Markedly reduced in thickness; acid soluble	Of normal thickness; acid insoluble
Roentgenographic findings on enamel	Invisible because of extreme thinness	Not differentiated from dentin

of protection of the crown against resorption because of the presence of a thin layer of uncalcified cementoid on its surface. Cementoid is, as osteoid tissue or predentin, relatively immune to osteoclastic destruction.[24, 25]

In the areas that are not covered by cementum, connective tissue reacts to the presence of enamel as to that of a foreign body. The enamel is attacked and resorbed by osteoclasts.[26, 27] This resorption, once it has started, proceeds toward the dentin and leads to the loss of large parts of the crown. The undermining irregular cavities are at first filled with loose connective tissue, in which bone formation occurs later.

Although the tooth moves occlusally as the bone apposition at the alveolar fundus proceeds, many of the resorbed teeth do not erupt, in part owing to the progressive resorption of those parts of the crown that should first emerge into the oral cavity.

TABLE 7.—ENAMEL HYPOPLASIA AND ENAMEL HYPOCALCIFICATION: DIFFERENTIAL DIAGNOSIS.

	Enamel Hypoplasia: Quantitative Defect of Enamel	Enamel Hypocalcification: Qualitative Defect (Softness) of Enamel
Local	Caused by local inflammation or trauma; affects circumscribed areas of single teeth; in most cases, only of one tooth; if more teeth are affected, there is no relation of the defects to chronology of development	Caused by local inflammation or trauma; affects single teeth; affected areas soft and chalky white or stained yellow or brown by secondary imbibition
Systemic	Caused by metabolic disturbances; symmetrical teeth affected; enamel defects as circular grooves or rows of pits; hypoplastic rings single or multiple; affected areas those in which enamel matrix formation occurred at time of metabolic disturbance	Caused by high content of fluorine in drinking water (over 1 part per million); all teeth affected in which enamel matures during time fluorine is taken up; teeth mottled by presence of chalky white or yellow to brown areas in enamel
Hereditary	Affects all teeth of about half members of family; crowns cone-shaped or cylindrical, yellow and glossy; surface hard	Affects all teeth of about half members of family; crowns dark brown and dull; enamel soft and soon lost by mechanical stresses

Normally, the connective tissue covering the crown atrophies when the tooth moves toward the oral epithelium. It can be assumed that the presence of an epithelial covering of the crown is necessary to bring about this atrophy of the tissues blocking the path of eruption and that a covering of growing cementum can act in the same way. This can be proved by the observation of herbivorous animals, the teeth of which are entirely covered by cementum. The lack of a layer of either epithelium or cementum

24. Gottlieb, Bernhard; Orban, Balint, and Diamond, Moses: Biology and Pathology of Tooth and Supporting Mechanism. New York: Macmillan Co., 1938.

25. Kotanyi, E.: Histologische Befunde an Retinierten Zaehnen. Ztschr. f. Stomatol., 22:747, 1924.

26. Worman, H. G.: Histopathologic Study of Impacted Teeth. J. A. D. A., 16:1885, October 1929.

27. Weinmann, J. P.: Histologische Befunde an. zaehnen einer Dermoid cyste. Vierteljahrschr. Zahnheilk., 43:446, 1927.

on the occlusal parts of the crown, and, therefore, a lack of the stimulus inducing the atrophy of the connective tissue between crown and epithelium makes normal eruption of the tooth, in many cases, impossible. It may lead even to a proliferation of the connective tissue so that the moving tooth covered by the mucous membrane bulges into the oral cavity. Whether a tooth in which resorption of the crown has already started erupts or remains embedded may depend on two conditions: (1) the size of the resorption area and (2) the distance of the occlusal part of the crown from the oral epithelium at the time that resorption begins.

Differential Diagnosis of Disturbances of Enamel Development.—The correlation of enamel defects with enamel development can be established not only in hereditary, but also in systemic and local anomalies of the enamel. The differential diagnosis between hereditary, systemic and local enamel hypoplasia and hypocalcification is based on the characteristics summarized in Table 7.

SUMMARY

1. Three families with hereditary brown teeth were examined genetically, clinically, roentgenographically and histologically. The anomaly was, in all three families, restricted to the enamel. The term amelogenesis imperfecta hereditaria is suggested for these anomalies.

2. The anomaly is in all probability a dominant simple mendelian character (not sex linked).

3. The anomalies can be sharply divided into two types: (a) hereditary enamel hypoplasia and (b) hereditary enamel hypocalcification.

4. Hereditary enamel hypoplasia is characterized by a quantitative defect of the enamel of all teeth, deciduous as well as permanent. The crown is covered by a thin layer of fairly well matured enamel and is, therefore, hard and glossy. Roentgenographically, the teeth seem to be lacking the enamel covering. The crowns are cone-shaped or cylindrical. The yellow tone of the teeth is caused by the visibility of the dentin through the thin enamel. All cases of hereditary enamel hypoplasia show multiple impaction of teeth. The embedded teeth are destroyed to a great extent by resorption of their crowns, starting at the incisal edge or the occlusal surface. The enamel of the teeth is, in the lateral cervical parts, covered by cementum.

5. Hereditary enamel hypocalcification is characterized by a qualitative defect of the enamel, which remains in a matrix stage. The enamel is acid insoluble and soft and is soon lost by mechanical stresses. The brown tone of these teeth is due to secondary imbibition by the enamel of pigments of blood or food material. Roentgenographically, the enamel is of the same opacity as the dentin. The unerupted teeth show a normal contour of the crowns. Eruption is not disturbed.

6. Amelogenesis imperfecta hereditaria seems to be caused by a primary defect of the enamel-forming organ. The lesion is more severe in enamel hypoplasia than in enamel hypocalcification. The impaction of teeth in the cases of hereditary enamel hypoplasia seems to be caused by premature degeneration of the reduced enamel epithelium, which normally covers and protects the crown until the tooth erupts.

SELF-HARDENING LINING MATERIALS*

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During the past few years, there have been placed on the market a number of commercial materials for relining dentures which appear to be resins softened by solvents, and which presumably harden by the evaporation of the solvent. The advertising claims are spectacular, to say the least: "guaranteed to equal the life of the denture," "1 minute chair time," "self-curing in the mouth without distortion," "perfect blending with the denture base," "fitting the denture is merely a 'trial bite' for the patient," "non-burning, non-stinging, non-toxic," "sets as hard as the denture base itself," etc. Since these materials are becoming quite widely used both in the United States and abroad, a critical investigation of their properties is herewith presented.

MATERIALS AND GENERAL PROCEDURE

The lining materials examined are listed in Table 1. Since the general results applied to all of the materials equally, and, therefore, there seems to be no reason to identify them in the subsequent discussion, code letters will be used throughout.

All of the materials were purchased on the open market. The tubes or jars of each material were purchased at different intervals in the hope that different batches would be obtained. Since only one of the products was stamped with a serial number, it is not known whether we were successful in this respect.

Throughout the investigation, the manufacturer's directions were followed as accurately as possible, and mouth conditions were always simulated as closely as the procedure would permit.

COMPOSITION

The only analysis of the nonvolatile compounds was made by the flame test,[1] using the hardened material. Since only very general conclusions can be drawn from such a test, there is no object in presenting the data in detail. All of the materials supported combustion; there was evidence of the presence of cellulose compounds in some of them, and all of them probably contained some acrylic resin. At least one of the materials was plasticized with an infusible and noninflammable plasticizer, as evidenced by the flying off of incandescent particles during combustion.

The volatile components, presumably the solvents, were analyzed by the Chemistry Department of Northwestern University Dental School. The results are presented in Table 2. The composition of material C was changed by the manufacturer during the investigation, and the last tube purchased contained a solvent different from chloroform. Unless otherwise indicated, it is to be assumed that the batches with the chloroform solvent were used in all tests.

Ethyl and butyl acetate are considered to be the least toxic of all of the organic solvents, but both of them are irritants

*Based on a thesis by Dr. Pomés in partial fulfilment of the requirements for the degree of master of science in dentistry, Northwestern University.

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‡Cirujano dentista; research fellow, Northwestern University Dental School.

1. Sweeney, W. T.; Paffenbarger, G. C., and Beall, J. R.: Acrylic Resins for Dentures. J.A.D.A., 29:32, January 1942.

when they are allowed to remain in contact with soft tissue for considerable time, partly because of their dehydrating action. Ethyl acetate is the most volatile and soluble of the two. According to Browning,[2] ethyl acetate "causes a hypersusceptibility to acute inflammations of the mucous membranes and to eczema-caused by long exposure to ethyl acetate," adding that "after relief of symptoms . . . in the same patient . . . by appropriate treatment, they returned with increased severity when a tooth was filled with a cavity lining and varnish with a characteristic smell of ethyl acetate."

TABLE 1.—LINING MATERIALS INVESTIGATED

Trade Name	Manufacturer or Distributor
Acryline	King's Specialty Co., Fort Wayne, Ind.
Dr. A. P. Craig's Permanent Liner	The Craig Dental Products Co., Chicago, Ill.
D-P Denturlyne	Dental Perfection Co., Los Angeles, Calif.
Dura-Liner	Reliance Dental Mfg. Co., Chicago, Ill.
Duplacryl	Coralite Dental Products Co., Chicago, Ill.
Getz-400 Permanent Liner	The William Getz Co., Chicago, Ill.

TABLE 2.—CHEMICAL ANALYSIS OF THE VOLATILE COMPOUNDS IN THE LINING MATERIALS

Code Letter	Analysis
A	Butyl acetate with a trace of a low boiling fraction, probably butyl alcohol
B	Ethyl acetate—trace of impurities
C	Chloroform and a small amount of monomer, which may have been some depolymerized resin*
D	Butyl acetate with a trace of low boiling fraction, probably butyl alcohol
E	Ethyl acetate
F	Ethyl acetate and some high boiling substance with spearmint odor

*In one tube only, a different solvent was noted, but it was not identified.

TABLE 3.—IRRITANT ACTION OF THE LINING MATERIALS ON HUMAN SKIN

Code Letter	Sensation After Application	Reaction After Twenty-Four Hours
A	Slightly perceptible for one minute	Slight erythema
B	Perceptible for twenty minutes	Perceptible erythema
C	Perceptible for twenty minutes	Perceptible erythema
D	Perceptible for twenty minutes	Perceptible erythema
E	None	None
F	None	None

tous conditions in the skin" when in contact. She further reports "a severe gingivitis occurring in a man in whom it was suggested there was a special sensitivity

Although the irritant action of the liners is hardly within the scope of research on physical properties, a somewhat superficial test was made by fastening 1 gm. of each of the materials under the forearm with adhesive tape, before they had hardened. The specimens were removed after twenty-four

2. Browning, E.: Toxicity of Industrial Organic Solvents, Report No. 80, Medical Research Council, Industrial Health Research Board (England), 1937, pp. 273-279.

hours, and the skin was examined. The results are presented in Table 3. With four of the materials, a burning sensation persisted for a short time after application, and a moderate erythema was observed after twenty-four hours. As can be noted, lining materials E and F caused no irritation to the skin. Since no correlation was observed between the irritant action and the type of solvent, it may be suspected that the amount of solvent in the respective material is as important as its type.

TRANSVERSE TEST

Strips of polymethyl methacrylate (commercial denture resin) with a thickness of 2.5 mm., width 10 mm. and length 65 mm. were prepared. The transverse testing equipment conformed to the testing requirements of the Tentative American Dental Association

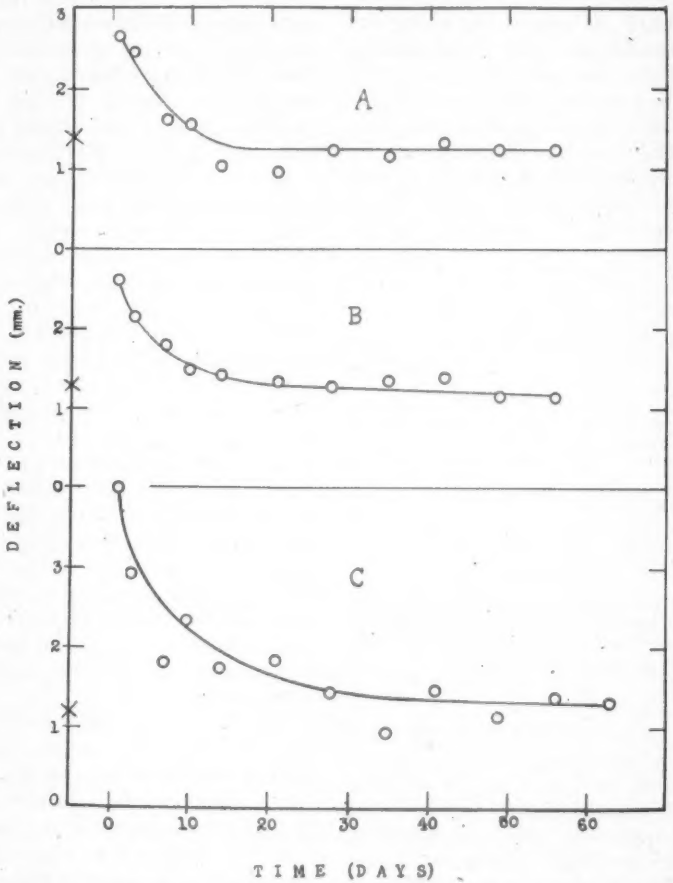

Fig. 1.—Deflection of denture resin under transverse load of 1,645 gm., after lining materials A, B and C had been applied. *X*, deflection of control specimens without liner.

Specification No. 12 for Denture Base Materials.[3] In order to provide a control test, the specimens of resins were stored in water at 37 C. (98.6 F.) for two days and they were subjected to a cross-blending load of 1,645 gm. for one minute, and the average deflection was noted for each resin.

The specimens (except the controls) were "lined" by pressing the lining material against the resin strip under a load of 500 gm. between glass plates the bottom one of which was the flat surface of a bottle containing water at 37 C. The manufacturer's directions for the manipulation of each material were followed scrupulously, so far as mouth conditions could be simulated. In this manner, a layer of lining material was formed which covered the entire area of one side of each resin strip to a thickness of approximately 1 mm. The "lined" specimens were then stored in water at 37 C. for twenty-four hours, after which the deflection in millimeters was noted under the previously selected load of 1,645 gm. The test was repeated periodically until the deflection so obtained became constant with time. The results are presented graphically in Figures 1-2.

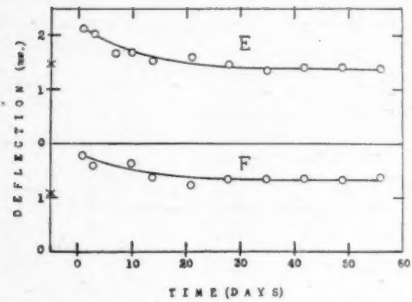

Figure 2.—Deflection of denture resin under transverse load of 1,645 gm., after lining materials E and F had been applied. *X*, deflection of control specimen without liner.

The general conclusion to be drawn from these results is that the denture resin must have been softened by the solvent in the liner. As can be noted, twenty-four hours after applying the lining material (the fiducial reading for all the graphs in Figures 1-2), the deflection was from 0.5 to 3 mm. greater than that of the original resin without the liner, in spite of the fact that the specimens were 1 mm. thicker after the liner was applied. Furthermore, if it is assumed that equilibrium conditions (or complete hardening) were reached when the deflection became constant with time, the time for complete hardening of the specimens, while they were in water at 37 C., varied from twenty days (liners A and B and F) to thirty-five days (liner C). Lastly, it should be noted that at no time did the specimens become so stiff as the original resin. Since, as previously stated, the thickness of the "lined" specimens was approximately 40-50 per cent greater than that of the original resin strip, the final deflection should be materially less than that of the original strip under the same load, if the liner became as stiff as the resin. Certainly the advertising claim, "sets as hard as the denture base itself," is not borne out by these data for any of the materials.

The decrease in stiffness of the resin after the liner was added may be explained by the action of the solvent. The solvent partially or totally dissolves the solid ingredients of the liner, and it is then supposed to evaporate when the material is exposed to the air. This action is taken advantage of in lacquers and certain types of varnishes, for example, and it is very effective in the case of thin films in which changes in the physical properties of the adhering surface are unimportant. In thicker layers, the solvent volatilizes from the

3. Tentative American Dental Association Specification No. 12 for Denture Base Material. J.A.D.A., 28:325, February 1941.

surface, and a thick coat or "skin" forms, which inhibits the volatilization of the solvent beneath. The trapped solvent then diffuses outward through the "skin" and inward into the denture resin. Since polymethyl methacrylate is attacked by these solvents, the softening of the denture base is easily explained.

Qualitative hardness measurements on the resin before and after "lining" demonstrated this effect by a considerable decrease in surface hardness, after the lining material C had been added, for example.

LOSS OF WEIGHT IN AIR

In order to study the rate at which the solvent evaporated from the liners, the loss of weight was determined while the materials were exposed to the air.

Disks of each lining material were prepared in circular molds, constructed in brass plates, 1.5 mm. in thickness. The diameters of the molds varied from 5.1 to 5.4 cm. The lining materials were introduced into the molds, covered with cellophane and pressed between glass plates under a load of 1,000 gm. Specimens of each material were produced in duplicate. After molding, one of the surfaces of each disk was exposed to the air at a temperature of 37 C. No measurements were made until the specimens had hardened sufficiently to be removed without damage. It is significant that a storage of as long as one week often was required before the materials were sufficiently rigid to handle. The first weighing was made at the end of the storage period, and undoubtedly considerable solvent had already volatilized. This procedure was adopted because our interest was centered on the rate of volatilization per square centi-

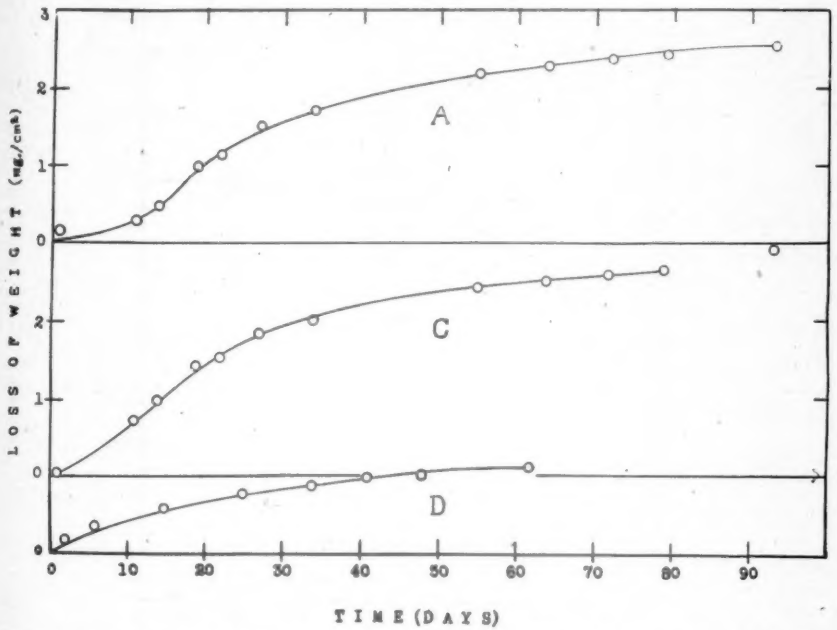

Fig. 3.—Loss of weight of lining materials A, C and D when allowed to harden in air at 37 C.

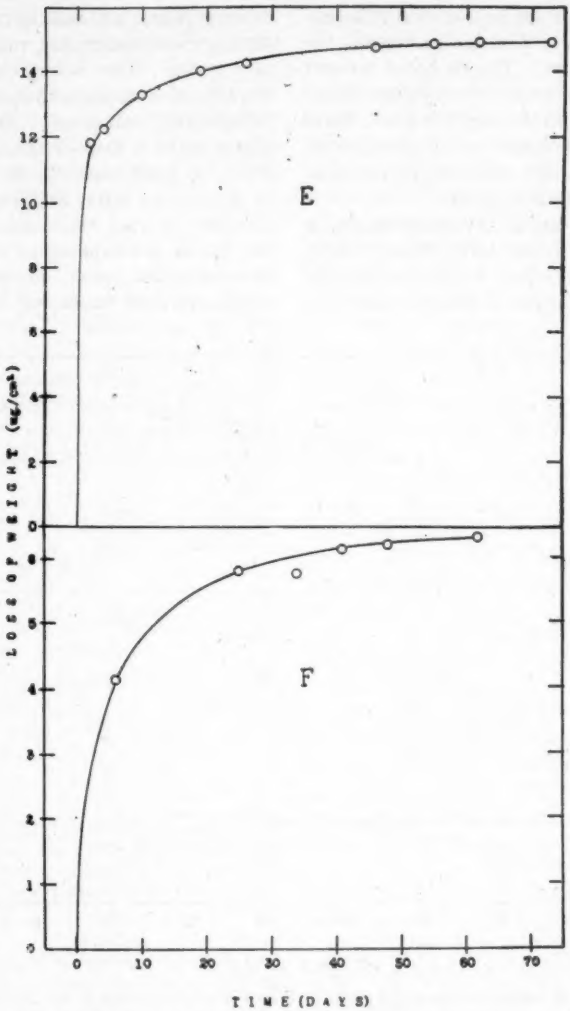

Fig. 4.—Loss of weight of lining materials E and F when allowed to harden in air at 37 C.

meter of surface area after the material was reasonably rigid and a "skin" had formed rather than on the total amount of solvent volatilized. The average loss in weight per square centimeter as obtained under these conditions is presented in Figures 3-4.

Careful observation of these graphs shows that, in all cases, the specimens were continuing to lose weight at the end of the observation period (forty-ninety days), and there is every reason to believe that some solvent was still retained in the specimens at the end of that period.

WATER SORPTION

Since the previous test did not con-

form to mouth conditions in that the specimens were not kept moist, fresh specimens were prepared, again in duplicate, in exactly the same manner, except that, at the end of the storage period, they were weighed and then stored in water at 37 C. They were weighed at frequent intervals thereafter. The results are presented graphically in Figures 5-6.

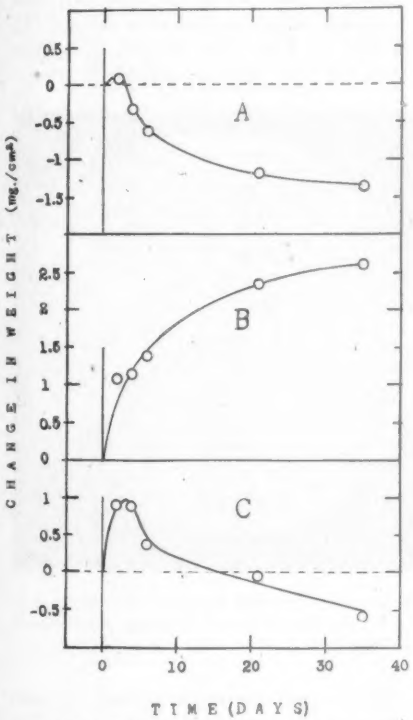

Fig. 5.—Change in weight of lining materials A, B and C while stored in water at 37 C.

When this experiment is applied to denture base materials, a gain in weight after immersion in water usually indicates an imbibition and swelling of the resin. Such a conclusion is, of course, not necessarily valid for all types of materials, since porosity and internal bubbles might be a factor in the gain in weight in water and swelling might not occur.

As can be noted, materials A and C (Fig. 5) exhibited an initial increase in weight, but, at a later time, both became lighter than the fiducial weight. (As previously stated, the manufacturer changed the formula for material C. Un-

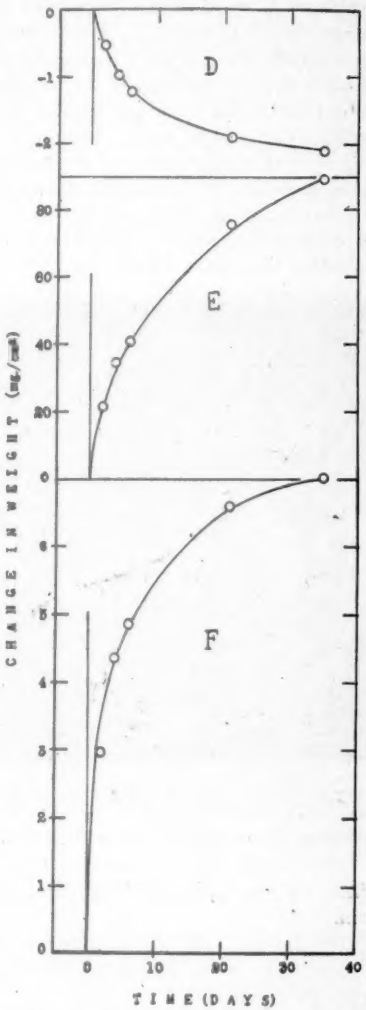

Fig. 6.—Change in weight of lining materials D, E and F while stored in water at 37 C.

fortunately, the specimens used for this test contained a different solvent, and therefore these data may not be comparable with those of the other tests on this particular material.) These seeming reversals are probably explained on the basis that the leaching of the solvents was delayed at the start, but became predominant at a later time. Material D (Fig. 6) lost weight from the beginning. Again, it should be noted that the specimens were losing weight at the end of the observation period, and it can be concluded that some solvent was still retained by the lining material and the resin.

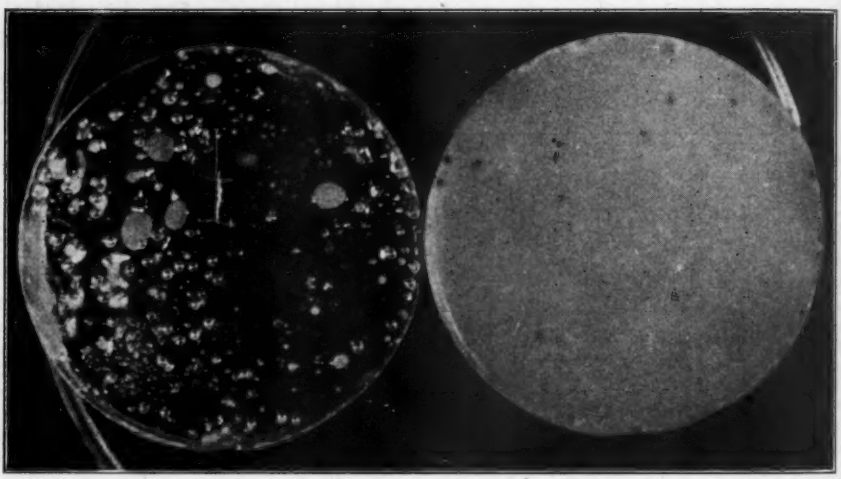

Fig. 7.—Specimens of lining material A. Bubbles are present in the specimen on the left. After being immersed in water for one week at 37 C., the specimen turned white, as shown on the right. This condition is generally typical of all the materials.

The amount and rate of gain or loss of weight in water is probably related to several conditions:

1. The nature of the plastic in the liner. Cellulose compounds generally are notable for their water imbibition, as are polyacrylic acid and certain of the acrylates.

2. The affinity of the solvent and the products of the solution for water. Ethyl acetate is many times more soluble in water than either chloroform or butyl acetate.

3. The amount of solvent present in the liner.

4. The porosity or bleb content of the hardened liner.

All of these are of course interrelated, and it is not surprising that the different brands of lining materials respond differently in this respect. It is significant that all of the materials that contained ethyl acetate as a solvent (B, E and F, Figs. 5-6) gained in weight from the start of observation. It is conceivable that the ethyl acetate was displaced by the water, and thus the gross weight was increased.

POROSITY AND WARPAGE

All of the specimens of lining materials contained bubbles or blebs after hardening for twenty-four to forty-eight hours, presumably caused by trapped solvent vapor or air. An analogous condition may occur in acrylic denture resins when curing is attempted without pressure. Evidently the vapor was under

pressure. This was demonstrated by puncturing a bubble under a drop of mercurochrome. In every instance, vapor bubbles appeared in the dye before it penetrated the puncture.

The bubbles in the liner were, of course, easily visible in the clear lining materials, but they were found in the opaque materials as well after they were sectioned. A typical example of bubbles in a clear material is shown on the left in Figure 7. It is interesting to note that this material (A) became opaque after being water-soaked for one week, as shown in the specimen on the right in the same figure.

Fig. 8.—Side views of specimens used for the transverse test. The resin strip on the left is a control. After "lining," warpage occurred toward the "lined" side.

All of the specimens used for the transverse test gave evidence of warpage, as shown in Figure 8 for material C. The warpage shown is typical in that the concave surface was always toward the "lined" side.

In order to investigate the matter farther, denture-resin specimens and metal models, used in a previous investigation,[4] and which simulated the posterior section of an upper denture, were "lined" and their warpage studied. These specimens previously had been subjected in water to a temperature of 80 C. (176 F.) for thirty minutes, and then stored in water at 37 C. for two years. Presumably, such treatment had relieved all processing strains.

Approximately 1 mm. of the "tissue side" of each specimen was trimmed away to make room for the liner. (Fig. 9.) After "lining," the specimens were allowed to remain in water at 37 C. for

Fig. 9.—Prepared resin specimen on metal model before lining material was applied.

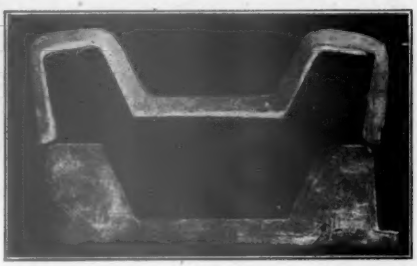

Fig. 10.—Typical warpage of specimen in Figure 9 with liner, after storage in water at 37 C. for nine weeks.

a week before they were removed from the model. They were then water-soaked at 37 C., without the models, for nine weeks, during which time visible warpage took place, until finally none of them would "go back" on the model, as shown in Figure 10. The time required for this amount of warpage varied for the different materials from two to nine weeks.

It was evident from the experiments

4. Skinner, E. W., and Cooper, E. N.: Physical Properties of Denture Resins: Part I. Curing Shrinkage and Water Sorption. J.A.D.A., 30:1845-1852, December 1, 1943.

that the thickness of the lining influenced the degree of warpage. For example, when the specimen was lined to a depth of approximately 0.5 mm., it could be replaced on the model with an error in fit of about 8 mm., which is obviously far from accurate. In this case, cracks, presumably due to localized shrinkage, appeared in the lining material, as shown in Figure 11.

It should not be inferred from these tests that the dentures will warp to this extent in clinical practice, since (1) the shape of the denture base would partially inhibit such changes and (2) the major portion of the warpage probably takes place while the denture base is somewhat softened by the solvent from the liner. Under such a condition, the edentulous arches themselves might mold the denture bases to some extent. The fact that any change takes place in the denture resin rather offsets the original purpose of the liners; namely, to stabilize the denture.

Fig. 11.—Cracks in lining material that appeared during hardening in water at 37 C.

SHRINKAGE

Although no direct measurements were made, considerable evidence that a great amount of shrinkage occurred during the hardening of these materials was brought to light during the course of the investigation. For example, during the preparation of the specimens for the change in weight tests, even though the disk molds were pressed between the glass plates with excess material, the thickness of the specimens decreased approximately 50 per cent during hardening. As previously noted, the "lined" resin strips always bowed toward the lined side. (Fig. 5.) This may be accounted for by the assumption that the resin was softened by the solvent and was bowed by the contraction of the lining material. Furthermore, many cracks appeared, which are additional evidence of contraction.

All of the above-mentioned specimens were hardened in air. As was previously noted (Figs. 5-6), some of the materials gained in weight in water, a condition that usually connotes imbibition and swelling. However, shrinkage cracks are evident in Figure 11, even though the specimens were stored in water from the start of the hardening process. Furthermore, it is difficult to explain the warpage of the specimens as illustrated in Figure 10, other than on the same basis as for the bowed strips. (Fig. 8.)

Immersion of a resin specimen without the lining material directly in the solvent failed to produce such a distortion. Consequently, any consideration of the release of processing strains as a

cause of such warpage is ruled out. The specimen of resin (polymethyl methacrylate) was placed in a covered petri dish, which was filled to a depth of 2 mm. with the solvent for lining material B. After a storage of two hours in the solvent, the specimen appeared as in Figure 12. The etching by the solvent vapor is plainly visible. The portion of the resin that was actually immersed in the solvent disintegrated completely, and the residue resembled a coarsely powdered glass.

CLINICAL APPLICATIONS

Four of the lining materials (A, C, E and F) were selected for use in relining dentures of patients in the Prosthetic Clinic of Northwestern University Dental School. Thirteen patients in all were treated. Careful records were kept for each patient, but only a general summary of the findings will be presented.

Material C produced a burning sensation for one hour after its application, and was ruled out of further consideration as being intolerable, if not dangerous, to the patient. The consistency of material F was such that it would not flow in the denture, and therefore it was discarded also. Several different lots of the material were tried, but they were all equally poor in this respect.

Materials A and E caused a burning sensation which became tolerable after from ten to thirty minutes. All of the patients complained that a "medicine-like" taste was noticeable for from two to twenty-four hours after lining. In one case, this taste persisted for one month.

As in the laboratory observation, the lining materials discolored or became opaque in the mouth after a time, and bubbles and cracks appeared in which débris and food collected. A softening and bleaching of the denture resin were sometimes evident, particularly in the thin labial flanges of immediate upper dentures. This finding does not substantiate the claim that these lining materials are indicated in immediate dentures to "follow up" the resorption of the alveolar process. The impossibility of controlling the hardening time of the liners was found to be a serious disadvantage in preserving the stability and retention of the dentures.

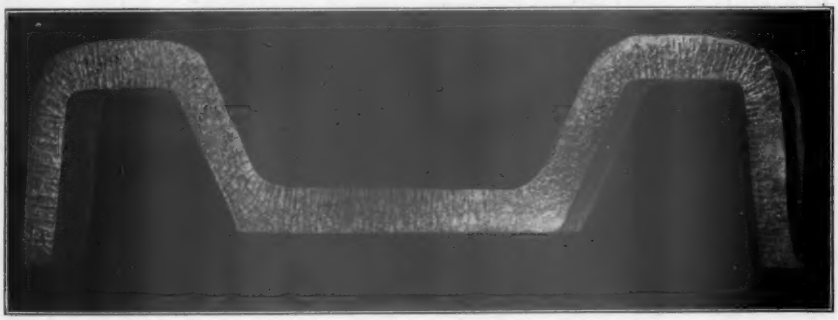

Fig. 12.—Etching pattern on side of resin specimen, caused by vapor from one of solvents. The other side, which was in direct contact with the solvent, disintegrated.

In view of these findings, further study in regard to stability and retention as related to time was thought to be unnecessary.

SUMMARY AND CONCLUSIONS

Six self-hardening denture lining materials were examined as to hardening rates, water sorption and effect on the

denture base. The following observations and conclusions are drawn from the data presented:

1. As nearly as could be determined, the materials were composed of a body containing synthetic plastics, which was dissolved or softened in chloroform, ethyl acetate or butyl acetate. All of these solvents are likely to be irritants to soft tissues. Four of the lining materials produced an erythema when in contact with the skin. Furthermore, irritation of the mucous membrane was intolerable for from ten to thirty minutes.

2. A softening of the denture resin was observed when it was in contact with the lining material, as evidenced by a lack of stiffness when the specimens were deformed transversely. This effect probably is due to the fact that the solvent penetrated the denture resin.

3. From twenty to thirty days was required for "lined" specimens to "harden" completely. It is doubtful whether any of the lining materials ever became as stiff or hard as the denture resin, since there was evidence of a loss of weight in air for these materials which continued for as long as ninety days.

4. Some of the lining materials exhibited a gain in weight and others a loss in weight in water. Although a gain in weight in water usually indicates an imbibition with swelling, evidence is presented that these materials shrink upon hardening: (a) All specimens warped toward the "lined" side. (b) Shrinkage cracks appeared in the liner, particularly in thin layers.

5. The laboratory results were generally substantiated by observation of clinical cases in which four of the lining materials were used.

Lastly, no lining material can be satisfactory that contains a solvent for the denture base material, unless the denture base and liner are held rigidly under pressure during the curing or hardening process, with complete elimination of the solvent. However, it is doubtful whether the solvent could be eliminated completely even under heat without complete fusion of the resin.

HUMAN DENTAL PULP AS A TISSUE-CULTURE PROVING-GROUND FOR NEW CHEMO-THERAPEUTIC DRUGS*

HERBERT M. PHILLIPS, B.S., D.D.S., M.S.D., Chicago, Ill.

THE discovery of the therapeutic value of the sulfonamides ended a long and discouraging era of chemotherapy. The idea that remedies could act in the body to destroy disease-producing agents is traced to the dim origins of medical lore; but it was not until Ehrlich's conquest of syphilis with arsenicals that chemotherapy was brought into prominence. As contemporary workers failed to duplicate his success in other diseases, the idea of *intra vitam* warfare soon lapsed into relative insignificance. With the advent of the sulfa drugs, Ehrlich's short-lived theory of specific therapeutic antidotes gave way to the new and promising bacteriostatic theory of chemotherapy. In the brief span of eight years, the sulfa drugs have triumphed over many previously intractable human ailments, and they have already meant the difference between life and death to many war casualties in the farthest corners of the globe.

The swift adoption by the health professions of these new and versatile drugs has caused the emergence of unanticipated cleavage lines in the prerogatives and limitations of each profession. Our own Accepted Dental Remedies states:

> Since all of the sulfonamide compounds are capable of causing relatively severe toxic reactions when used internally, it is the opinion of the Council that the extensive oral administration of these compounds in general dentistry is not advisable. When the need for such medication arises, it should be given in cooperation with the patient's physician.[3]

In reviewing the rationale of local therapy, it seems that our limitations in theory are a negligible handicap. In the first place, it can be shown, in a very real sense, that all sulfonamide therapy is local therapy. Whether the administration is systemic or topical, the purpose is to gain high drug concentration in and adjacent to the site of infection. Whereas the blood levels, through general administration in the area of the wound as elsewhere in the body, are limited to 15 mg. per hundred cubic centimeters, it has been shown repeatedly that direct and local application of the drugs to the lesion itself raises blood and tissue levels in some cases to 800 mg. per hundred cubic centimeters, the limitations being imposed only by the solubility of the drug.[9] There are, of course, many instances wherein the combined treatment is best. However, as long as the professional consensus has limited our use of the sulfa drugs largely to local therapy, we should know, employ and investigate further all of the values inherent in this method of administration.

In medicine, the sulfa drugs have been used locally in wound infections, burns, ulcers, thrombophlebitis, compound fractures, gas gangrene, tetanus, peritonitis and infections of the biliary and gastrointestinal tracts, pleural cavities, eyes,

*Abstract of thesis submitted in partial fulfilment of the requirements of Northwestern University for the degree of master of science in dentistry. Degree conferred June 14, 1944. Research directed by Stanley W. Clark, William G. Skillen, Evelyn B. Tilden and Edward H. Hatton.

ears, sinus and pharynx and genitourinary tract. They have been used extensively in dermatology and orthopedics and have been reported useful in dentistry in the treatment of osteomyelitis, actinomycosis, cellulitis, Ludwig's angina, fracture and extraction wounds, and in the prevention of endocarditis.[21] There is a growing volume of literature dealing with the experimental and clinical research in medical and dental journals and, from these reports, there is emerging a body of uncontroversial facts accompanied by a chain of pointed and significant controversies. The quandaries and enigmas posed by the dental literature may be analyzed under the terms "basic properties" and "secondary, or side, actions."

It is agreed that the sulfa drugs are basically bacteriostatic chemotherapeutic agents. However, the eight or more current attempts to explain this action testify to the fact that the *modus operandi* remains conjectural.

Fig. 1 (Specimen 13 S).—Cross-section of lower right third molar, in man aged 38. Sulfanilamide was implanted in the pulp under septic conditions. The tissues and fluids of this pulp were in contact with sulfanilamide powder for two hours and presumably absorbed the dissolved drug in sufficient quantities. On the whole, the pulp is normal in appearance. There is no inflammatory process in evidence. The vascular picture may be considered normal and the odontoblasts are for the most part continuous and intact. The fibrous ring subjacent to the exposure area is identified as compressed tissue and does not represent a pyogenic membrane. The vacuole in the upper right corner has the appearance of a pulp abscess, but is actually an artefact that occurred in the fixing or cutting process. It should be noted that in this pulp sulfanilamide was implanted. Comparison may be made with other pulps in which sulfathiazole was implanted. The high magnification showed blood vessels that were packed with erythrocytes, and few leukocytes were observable in the blood vessels or the tissues. There was no pain experienced in this case.

Of equal importance in determining the clinical use of these drugs are the secondary, or side, actions of the drugs,

which are, after many indecisive animal experiments and clinical studies, still debated. The controversies revolve around the irritant and toxic properties of the drugs and their influence on pain, healing, hemorrhage, rate of epithelization and scarring. Experiments in local therapy have been performed on rats, cats, dogs and monkeys; and the tissues studied involve the brain, eye, stomach and intestine, muscle, peritoneum, bone and tooth sockets.[23] The last named is the only experimental area investigated in dental research on experimental animals, although many clinical studies involve reports of implantation of the drug in postextraction wounds. The solution as to the basic and secondary properties is urgent because of its clinical importance, as many questions in therapy, such as "Should the drugs be used in clean, relatively aseptic wounds, prophylactically in contaminated wounds or therapeutically in frankly infected wounds?" depend for their answers on the nature of bacteriostasis and on the secondary characteristics of the drug. Methods of administration have likewise been on a trial and error basis and must remain so until rational medication can be based on more precise understanding of the exact nature of the drug in question.

A review of all methods for testing drugs shows that none are applicable to the new chemotherapeutic agents. In trying to devise a new and decisive test to solve some of the problems posed by the medical and dental literature, it occurred to us that the human dental pulp might provide a suitable proving ground for analysis of the disputed issues.

In theory, this proposition seemed promising. Biopsy material composed of representative connective tissue is inadvertently taken every time a vital tooth is extracted. Being encased by unyielding walls, it may be removed without distortion and can be retained intact through the long period of preparation for histologic section. Pairs of analogous teeth within the same mouth provide an excellent opportunity for controlled experimentation. Like wounds in which the drug is used, human pulps occur in

TABLE 1.—SUBJECTIVE DATA—SEPTIC PULPS

Implanted Pulps			Control Pulps		
Specimen	Pain Before Implant	Pain After Implant	Specimen	Pain Before Exposure	Pain After Exposure
1 S	Slight	Slight	2 S	Slight	Slight
3 S	Slight	None	4 S	Slight	Mild
5 S	Slight	None			
6 S	None	None	7 S	Slight	Severe
8 S	None	None			
9 S	Mild	None			
10 S	Slight	None	11 S	None	Severe
12 S	Slight	Slight			
13 S	None	None			
14 S	None	None			
15 S	None	None			
16 S	None	None			
17 S	Slight	None			
18 S	None	None			
			19 S	None	None
2 S	Slight	Slight			

aseptic and septic states. Thus, in theory, the human pulp provides biopsy material of infected and uninfected tissue for controlled experimentation and is unique in furnishing with social sanction opportunity for both clinical and necropsy observations on man himself. It seems that, in addition to having a great stake in the advancement of local sulfonamide therapy, dentistry has, within its own field of activity, a tissue that is uniquely suited to study of the new chemotherapeutic drugs.

Fig. 2 (Specimen 6 S).—Cross-section of lower right second molar, in a girl aged 17. The test was continued for one day. A culture was negative. The surfaces were disinfected with phenol. There was no pain. The specimen was in contact with sulfathiazole for thirty hours and the tissues were presumably bathed in or saturated with the dissolved sulfathiazole. The pulp, on the whole, appears normal, and there is no inflammation or degeneration. The blood vessels are neither distended nor engorged. Under high magnification, it was noted that the membrane subjacent to the exposure area was composed of mechanically compressed tissue elements and vessels, but there was no leukocytosis in the vessels or in the surrounding tissues. The sections stained for bacteria showed no organisms and there was no cytologic evidence of infection.

MATERIALS AND METHODS

To test the feasibility of the proposition, we selected for experimentation nineteen noncarious, nonpyorrheic teeth that had been condemned to extraction. All pulps were exposed under aseptic conditions and in ten sulfathiazole was implanted. Nine were left unmedicated, as controls. Nineteen specimens, presumed infected because of carious exposure, were similarly treated. Fourteen of these were implanted with sulfathiazole and five were left unmedicated, as controls. All exposed areas were sealed with cement until extracted. The experimental intervals ranged from two hours to 273 days. The sixteen patients involved varied from 12 to 57 years in age. Data were col-

lected in relation to pain, and all teeth were prepared for histologic study. Bacteriologic observations were made from special stains of the histologic specimens. In addition, seventeen were cultured.

Sulfathiazole was chosen as the test drug as it is thought by some authorities[20] to be most effective against *S. viridans,* the organism most consistently reported to be the principal offender in pulp infections.[1] All teeth were anesthetized with 2 per cent procaine hydrochloride in an alkaline vehicle, and an attempt was made to put the solution as far away as

powdered sulfathiazole was sprayed into the cavity so that a white hoarfrost coating adhered to the exposed pulp. To provide a reservoir of the drug, an excess of the powder was used to blanket the floor of the cavity. No sulfathiazole was placed in the control tooth, and no other medicament was used either on the implant or in the control.

To protect the exposed pulp from any pressure in applying the oxyphosphate cement filling and to preclude any disturbing action that this filling might have when applied directly to the pulp, a piece of gold foil, chosen because of its chem-

TABLE 2.—SUBJECTIVE DATA—ASEPTIC PULPS

Implanted Pulps			Control Pulps		
Specimen	Pain Before Implant	Pain After Implant	Specimen	Pain Before Exposure	Pain After Exposure
1 A	Slight	Slight	2 A	Slight	Slight
3 A	None	None	4 A	None	Severe*
5 A	None	None	6 A	None	Mild*
7 A	None	None	8 A	None	None
9 A	None	None	10 A	None	Slight*
11 A	None	None	12 A	None	None
13 A	None	None	14 A	None	None
15 A	Slight	Mild	16 A	Slight	Mild*
			17 A	Slight	Mild*
18 A	None	None			
19 A	None	None			

*These pains were periapical, not intrapulpal.

was possible from the cavity. Teeth were selected in pairs, one for implant and one for control; and, as nearly as possible, all were subjected to the same operative procedures. With the conventional aseptic precautions common to root-canal therapy, each experimental tooth was isolated with a rubber dam. Black cavity preparations were made. The actual exposure was made through the floor of the cavity with a chisel, and special care was exercised not to disarrange the subjacent pulp tissue. At this point, one tooth was selected for the implant. With a DeVilbiss atomizer,

ical inertness, was placed between the two. The foil was sterilized by flaming and then was adapted to the floor, but not to the walls of the cavity. Care was taken to exert no pressure on the pulp at the point of exposure, so that, in effect, the foil bridged over, and did not impinge on, the pulp. A regular mixture of oxyphosphate cement was used to seal the cavity.

After a predetermined period, the patients returned and the teeth were extracted. All specimens except those used for bacteriologic experiment were placed in formaldehyde immediately after the

cement filling and the foil had been removed with a chisel.

The seventeen teeth that were cultured were handled with extraordinary precaution. After extraction, the teeth were placed on a piece of sterile gauze in a sterile petri dish. Then the entire exterior of the tooth was bathed in a 5 per cent phenol solution for eighteen minutes. The phenol was washed off the exterior in three successive baths of sterile water.

After the exterior of the tooth had been disinfected, extreme efforts were made to avoid contamination. The materials were sterilized either in the autoclave (rubber gloves, etc.) or in the dry oven (cotton points, pliers, etc.). Using sterile gloves and working on sterile towels, the operator removed the cement filling and foil. A sterile cotton point was introduced into the pulp chamber until the tip became moist with blood and exudate. This point was used to

Fig. 3 (Specimen 7 S).—Cross-section of lower right first bicuspid, in girl aged 17. The test was continued for one day. Culture was positive and the surfaces were disinfected with phenol. There was slight pain before extraction, severe after. This pulp was unmedicated and was used as a control for specimen 6 S (Fig. 2). The pulp on the whole is normal in appearance and shows little inflammation. There is some evidence of mild hyperemia. There are some scattered leukocytes in the tissues and a somewhat larger than normal proportion of them in the blood vessels. There are crumbs of dentin and tissue débris above the pulp stump. S. viridans was recovered from this specimen, although the sections specially stained for bacteria showed no organisms and there was no cytologic evidence of sepsis.

inoculate a blood-agar plate and Brewer's medium. Both were incubated for forty-eight hours.

Two series of collateral experiments were performed on dogs.

All histologic specimens were stained with hematoxylin-eosin, and, in order to bring out micro-organisms, the Brown and Brenn technic was also employed on all specimens.

TABLE 3.—RESULTS AS TO PREEXISTING PAIN

Pain	Septic Pulps		Aseptic Pulps		Total
	Implanted	Control	Implanted	Control	
Decrease	5	0	0	0	5
No change	3	1	1	1	6
Increase	0	2	1	2	5

TABLE 4.—BACTERIOLOGIC DATA—HUMAN PULPS

Group	Implanted Pulps				Control Pulps			
	Specimen	Assumed	Mouth Culture	Laboratory Culture	Specimen	Assumed	Mouth Culture	Laboratory Culture
	1 S	Positive	Negative		2 S	Positive	Positive	
	3 S	Positive		Negative	4 S	Positive		Positive
	6 S	Positive		Negative	7 S	Positive		Positive
Septic	8 S	Positive		Negative				
Group	9 S	Positive*		Negative				
	2 S		Positive	Negative				
	1 A	Negative	Negative	Negative	2 A	Negative	Negative	Positive
	3 A	Negative		Positive	4 A	Negative		Negative
Aseptic	5 A	Negative		Negative	6 A	Negative		Negative
group	7 A	Negative		Negative	8 A	Negative		Negative
	10 A	Negative		Negative				
	1 S		Negative	Positive				

*Confirmed by mouth culture before implantation.

RESULTS

Results obtained are recorded in the seven tables, and five representative photomicrographs present the histologic findings.

The study in general proved feasible. We found that patients will cooperate, the pain involved is inconsiderable and analogous pairs of condemned teeth are not difficult to find. We confirmed the fact that the pulp is reliable material for study of the irritant and toxic properties of drugs, but yields data that must be regarded at this time as inconclusive on the issues of bacteriostasis, pain, healing and hemorrhage.

In the literature dealing with local sulfonamide therapy, the question of the irritant and toxic properties of the drug is first in prominence and second in clinical importance only to questions related to the mode of bacteriostasis. Our study showed that the tissue area known to be bathed in, or saturated with, the drug manifested no immediate or de-

layed untoward action attributable to the drug. In fact, the medicated pulps were, on the whole, better preserved than the control pulps. This evidence may be interpreted to mean that the test drug is nonirritating and nontoxic in pulp wounds. The literature that makes claims counter to this assertion, in some instances at least, refers to the foreign body reaction to the presence of undissolved powder or crystals. The presence of any agent that mechanically displaces tissue would tend to cause an inflammatory condition and delay healing. Unless it can be shown that the tissues containing the dissolved sulfa drug evidence an irritant or a toxic reaction, the claims for toxicity must be on a mechanical, and not a chemotherapeutic, basis; for the drug is in fact impotent in antibacterial activity until it is dissolved. Figure 2 shows pulp tissue known to be metabolizing while its fluids are saturated with the sulfa drug. It shows no more inflammatory reaction than its control (Fig. 3).

In general, in our study, the implanted specimens showed no atrophic, inflammatory or vascular derangement attributable to the presence of the drug. The implanted pulps seemed on the whole better preserved, and pain was less frequent than in the control teeth. Presumably, the reverse would be true if the drug were irritating and toxic to pulp tissue.

Fig. 4 (Specimen 19 A).—Cross-section of upper right third molar in woman aged 37. The test was continued for two days. Implantation of sulfanilamide was carried out under aseptic conditions. There was no pain before or after implantation. Presumably, at the time of extraction, there was a high concentration of the drug in the interstitial spaces of the pulp (up to 800 mg. per hundred cubic centimeters). The concentration in the deeply stained cells to the left of the exposure area does not represent an inflammatory process, as the cellular elements are erythrocytes. The pulp is, on the whole, normal. The tissue arrangement and the vascular system are typical of an uninflamed pulp. The odontoblasts are continuous and intact.

It was found that other properties of the test drug, both basic and secondary,

were less susceptible to analysis in the pulp. Bacteriostasis was difficult to assay because the technics of investigating the bacterial flora of the pulp are in themselves too inconclusive. Whereas the data obtained in our culturing technic seemed to indicate a suppression of organisms by the drug, the bacterial staining and the cytologic evidence of infection were not reassuring on this point.

In the five instances wherein the drug was used in pulps that were assumed, on the other secondary attributes, a decisive analysis on each point was not possible. Pain proved variable in both etiology and symptoms. However, the over-all recordings indicated a lower incidence of pain in the medicated pulps. Of the ten implanted teeth that evidenced pain before implantation, five showed a decrease of pain after medication. Of the six control teeth that evidenced pain prior to exposure, none registered a decrease of pain. Of the

TABLE 5.—SUMMARY OF BACTERIOLOGIC RESULTS

Change in Bacteriologic Findings		Septic Pulps		Aseptic Pulps		Total
		Implanted	Control	Implanted	Control	
Contamination	No bacteria to bacteria			2	1	3
No change	No bacteria to no bacteria			5	4	9
	Bacteria to bacteria	0	3			3
Elimination	Bacteria to no bacteria	6	0			6

TABLE 6.—SUMMARY OF HISTOLOGIC RESULTS ON VITALITY—HUMAN PULPS

Condition	Septic Pulps		Aseptic Pulps		Total Pulps
	Implanted	Control	Implanted	Control	
Vital	14	4	10	4	32
Nonvital	1	0	0	5	6

or presumed from culturing, to be septic, none showed positive cultures after implantation. All control teeth assumed to be septic were shown to be positive when cultured. Two of the six pulps assumed, or presumed from culturing, to be aseptic became contaminated after implantation, and only one of the six control teeth assumed, or presumed from culturing, to be negative at the time of exposure, was shown to be negative when cultured.

Although pertinent data were gained twenty-four implanted specimens, only one tooth registered an increase in pain, and eight out of the fourteen control pulps registered more pain after exposure. This lends support to the assertions in other studies that the drug has an analgesic action, but must be considered inconclusive in this study. The fact that use of the drug did not cause or increase painful symptoms supports the assertions as to nontoxicity made in this study and elsewhere.

The healing mechanism proved too

Fig. 5.—Cross-section of pulp of dog's tooth in which sulfathiazole was implanted eighty days before extraction. Except for the peculiar vacuolization shown under high magnification, the pulp is in an excellent state of preservation. There is almost no inflammatory reaction. The vessels are slightly distended and the odontoblasts are intact.

delicate and atypical in the human pulp to warrant positive conclusions on this phase of the study. All pulps showed a tendency to undergo degenerative changes incident to the advance of time. Whereas the implanted specimens seemed better preserved and yielded to retrograde tendencies more slowly, the salutary effects were limited and inconclusively disclosed. Effects on rate of

epithelization and scarring obviously could not be studied in the pulp tissues.

We cannot generalize about the effects of use of the drug on hemorrhage from observations made within the confines of the tooth in pulp wounds. It can be said with certainty, however, that the medicated specimens showed no interstitial or petechial hemorrhages. Spraying the drug through the exposure onto the bleeding pulp arrested hemorrhage. This was probably a mechanical effect, but it may be said that there was no evidence that use of the drug causes or increases the tendency to hemorrhage, as asserted by some.

Collateral experiments were performed on the sixteen cuspid teeth of four dogs. Bacteriologic studies proved more difficult on dog teeth than on human teeth, and contamination was, with the technic employed, unavoidable. On the whole, the implanted dog pulps showed no untoward reaction that was not common to the controls.

TABLE 7.—SUMMARY OF HISTOLOGIC COMPARISON OF IMPLANTED AND CONTROL HUMAN PULPS

Comparative Condition	Septic	Aseptic	Total
No. implanted pulps worse than controls	0	2	2
No. implanted pulps same as controls	1	0	1
No. implanted pulps better than controls	2	6	8

It can be said, from the experience gained, that sulfathiazole has limited therapeutic value in the treatment of pathologic conditions of the pulp. Its lack of toxicity and irritant properties and its possible analgesic and salutary effects, in addition to its basic bacteriostatic properties, would commend its use as an adjuvant to pulp-capping procedures that are already satisfactory; but the drug does not inhibit retrograde changes.

Applying the evidence gained in this study to the clinical issues in dispute, it may be said that the drug can be used in clean, relatively aseptic wounds with impunity, and it is certainly prophylactically indicated in contaminated wounds as well as therapeutically in septic wounds. The method of administration should be chosen with consideration of the fact that although dissolved sulfathiazole is nontoxic, the presence of large quantities of the undissolved powder or crystals may have a foreign body reaction and delay healing. Quantities in excess of the amount that the tissues can absorb are contraindicated. Spraying the drug with an atomizer is, on the whole, more satisfactory than using the powder in bulk form, and the finer the powder or crystals, the more readily they will go into solution in the tissue fluids.

Most of the inconclusive elements in this study will yield to more exact analysis and decisive conclusions when research technics relevant to a study of the pulp are perfected. This applies especially to the methods for making significant bacteriologic observations. Using the basic procedures described in this report, a study of the tissue reactions to penicillin therapy is now being made at Northwestern University Dental School, the results of which will be reported later.

CONCLUSIONS

1. The human pulp was found to be a clinically practical and histologically suitable tissue for a study of the irritant and toxic properties of sulfathiazole and presumably other therapeutic agents alleged to have merit in the local treatment of septic and aseptic wounds.

2. Sulfathiazole was found to be neither irritant nor toxic in pulp wounds.

3. The use of sulfathiazole in pulp therapy was found to be limited to the

role of adjuvant to accepted pulp-capping technics.

4. Although there were indications that sulfathiazole aided natural defenses in the struggle against pathogenic microorganisms in the pulp, it was found that the technics of studying pulpal flora are too inconclusive to analyze the exact mode of bacteriostasis.

5. Sulfathiazole therapy tended to alleviate, but did not invariably eliminate pain in pulp wounds.

6. No evidence of tissue repair or regeneration was observed in this study, and the effect of sulfathiazole therapy on healing could not be experimentally determined.

7. There were indications that sulfathiazole therapy had a limited salutary effect in pulp wounds.

8. It was found that sulfathiazole therapy did not induce intrapulpal hemorrhages, and, in bleeding pulp wounds, it mechanically facilitated clotting.

9. Sulfathiazole therapy initiated no untoward reaction in the dog pulps.

10. The results of this study indicate that if sulfathiazole is administered in quantities that will readily dissolve, it may be used with impunity in clean wounds as well as in contaminated and septic wounds.

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EXPERIMENTAL DEVELOPMENT OF BONE THROUGH APICAL FORAMEN

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AFTER an accident involving the face, the crowns of anterior teeth are often found to be fractured. In many of these cases, the pulps die and treatment becomes necessary. If the root end is completely calcified, treatment dressings can be placed with little difficulty. However, when the root end is unformed, such treatment becomes impossible and extraction is usually indicated. Following is a case involving a tooth with an open apex and nonvital pulp that was saved by encouraging deposition of calcified material in the canal.

REPORT OF CASE

History.—A boy, aged 8 years, seen at the Northwestern University Dental School clinic, January 9, 1944, with a complaint of pain in the upper central incisors, had fallen in play three days earlier, fracturing both upper central incisors.

Examination.—The pulp of the left central incisor was exposed. When the teeth were tested for vitality, the left one gave a nega-

Fig. 1.—Divergent canal at apical region with diagnostic wire in place for determination of length.

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tive response. The right was still vital. On roentgenographic examination, the root end of the left central incisor was found to be undeveloped with a flaring canal, and it was thought inadvisable to fill the root canal with gutta-percha.

Fig. 2.—Canal with chemical salts placed in apical region and apical one-third, remainder of canal being filled with gutta-percha.

Fig. 3.—Resorption of salts after about two weeks.

Operation and Treatment.—After sterilization of the field, the canal was opened. The pulp, which was partly liquefied, was removed with a broach. The canal was then flooded with peroxide and dried with paper points. A dry beechwood creosote dressing was placed in the canal. On the following day, the canal was found to be dry and apparently clean.

Chemical salts[1] in the proportion found in bone, incorporated in a gelatin base, were placed in the canal and, under slight pressure, were forced into the space around the apex of the tooth. The canal was filled with

Fig. 4.—Building in of calcified material after one month.

Fig. 5.—Complete calcification of canal after five months.

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the paste to one-third of its length. (Fig. 2.)

Gutta-percha cones of approximately the same diameter as that of the canal were then placed in the canal until they were felt to engage the bone salts. The remainder of the canal was filled with gutta-percha and temporary crowns were placed on both central incisors. No suppuration, tenderness or pain followed the treatment.

Course.—Roentgenograms were taken weekly, and it was noted that, in about two weeks, the area around the apex and in the lower third of the canal had begun to grow less dense, the condition suggesting that the bone salts were being absorbed. (Fig. 3.) It was thought that a bony matrix was being laid down, as roentgenograms taken one month after treatment showed increasing density. (Fig. 4.)

As it was now believed that the treatment would be successful, acrylic crowns were placed on both central incisors.

Outcome.—The tooth has now been treated for a period of five months, during which time there has been no discomfort or pain. The roentgenograms do not suggest any pathologic condition in the canal or in the tissue surrounding the apex of the left central incisor. (Fig. 5.) Whether this calcified material is bone or some other deposit cannot be determined accurately until such a tooth is removed and sectioned, but it can be assumed that the dense material in this area is compatible with surrounding tissue, and may be bone.

EFFECT OF REDUCED ATMOSPHERIC PRESSURE UPON RETENTION OF DENTURES*

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IT HAS long been held that the factors in retention of full dentures are (1) certain physical forces; (2) correct denture outline and contours; (3) correct occlusion and articulation of the artificial teeth, and (4) muscular action. We are concerned with but the first of these.

The purely physical forces related to denture retention are adhesion, atmospheric pressure and gravity. Most authorities believe that adhesion and atmospheric pressure are retention factors in both upper and lower dentures, while gravity also assists in the retention of lower dentures.[1, 2] On the other hand, some contend that atmospheric pressure plays little or no part in the retention of dentures.[3, 4]

It seems to be chiefly from the adherents of the mucostatic theory that doubt arises as to the relationship between atmospheric pressure and retention.

Strangely enough, with such a controversial subject, no available experimental data seem to be recorded in the literature, and most of the modern textbooks

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TABLE 1.—RELATION BETWEEN ALTITUDE AND ATMOSPHERIC PRESSURE

Altitude, Feet	Atmospheric Pressure*
0	14.70
5,000	12.23
10,000	10.11
15,000	8.29
20,000	6.75
25,000	5.54
30,000	4.36

*Pounds per square inch.

on prosthetic dentistry do not contain any discussion of atmospheric pressure as it pertains to the "suction" of full dentures.

These theories were tested by making use of a standard low-pressure chamber, such as is used in training flying personnel for high altitude flights.

A number of persons who wore dentures were studied to determine whether reduced atmospheric pressure would affect denture retention. Originally, no satisfactory means could be devised whereby one's own dentures could be used successfully for the tests. Therefore, special denture bases were constructed for each of the seven persons studied, as follows:

1. Maxillary impressions were taken using modeling compound and a soft impression wax. Slight relief was given by scraping over the center of the palate, but no additional relief or so-called "suction" chamber was incorporated in the finished bases.

2. Acrylic baseplates were then constructed, four ordinary small screw eyes being cured in each, as shown in Figure 1.

3. One was placed in the central incisor region; another, in the approximate center of the palate, and one in each of the second bicuspid regions.

4. A small spring hand scale was secured. The end was designed to fit into the screw eyes of the baseplates as shown in Figure 1. A direct pull could thus be exerted on each of the four screw eyes to dislodge the denture. The testing scale had a limit of slightly over 6 pounds pull.

A heavier scale was decided against because of the possibility of injuring the patient's mouth should the denture loosen suddenly when a greater pull was applied.

Then, one at a time, the "dentures" were inserted and tested as follows:

The operator seated the denture base

TABLE 2.—DENTURE RETENTION TESTS USING PREPARED MAXILLARY BASEPLATES*

Case	Sea Level	30,000 Feet
	Pull applied to anterior region	
1	96+†	96+†
2	96+†	80
3	96+†	96
4	96+†	80
5	96+†	96
6	96+†	70
7	96+†	78
	Pull applied to palate	
1	22	14
2	92	56
3	96+†	62
4	30	16
5	26	16
6	22	10
7	90	52
	Pull applied to left bicuspid region	
1	43	22
2	88	32
3	60	15
4	64	34
5	8	3
6	40	20
7	96+†	58
	Pull applied to right bicuspid region	
1	96+†	45
2	75	30
3	56	16
4	96+†	68
5	20	8
6	49	26
7	96	50

*Dislodging force shown in ounces.

†Case failed to dislodge when full force of scale (96 ounces) was applied. Each figure represents the average of six tests.

TABLE 3.—DENTURE RETENTION TESTS USING PATIENTS' OWN MAXILLARY DENTURES

Case	Force (in Ounces) Required to Dislodge Dentures	
	Sea Level	30,000 Feet
1	96+*	96+*
2	96+*	80
3	80	32
4	88	41
5	41	18

*Denture did not dislodge when full limit of scale, i.e. 96+ ounces, was applied. Each figure is the average of six tests.

firmly by digital pressure in the palate. The spring scale was inserted in the central incisor screw eye. A pull was then exerted as nearly as possible at right angles to the "plane" of the denture. At the instant that the denture loosened, the applied force was noted.

The base was then reinserted, as before, and the same test applied. This was repeated six times. This procedure was followed on each of the three remaining screw eyes. Thus, twenty-four tests were performed in each case.

The same tests were repeated in the case of each of the remaining patients.

The determinations were made first at sea level, where the atmospheric pressure is 14.7 pounds per square inch. The investigators and patients then entered the low pressure chamber. Here, the atmospheric pressure can be reduced at will to correspond to the pressures found at different altitudes. An "ascent" was made to 30,000 feet at the rate of 3,000 feet per minute. At this point, atmospheric pressure is reduced to 4.36 pounds per square inch as compared with a pressure of 14.7 pounds per square inch at sea level. Table 1 is a comparative table of altitudes and air pressure.

At high altitudes, the oxygen content of the atmosphere is also reduced in proportion to the reduction in pressure. Under such conditions, one is unable to remain conscious for more than from forty-five to sixty seconds unless appropriate measures are taken. Therefore, all participants used a dilutor demand regulator and an A-14 oxygen mask during the run.

Retention tests were then made as at sea level in the following manner: A patient would remove his oxygen mask for a period of from fifteen to twenty seconds while one test was made. He would then replace his mask for a few moments, after which he would remove it while another test was performed.

This process was repeated until twenty-four readings had been made upon each individual as at sea level.

It was believed that, by making six readings at each test point, the possibility of experimental error would be reduced. The comparative results of each test were very consistent. The results are given in Table 2.

Shortly after this series of tests were made, a means was devised whereby the individual's own dentures could be used for making retention tests. The method was somewhat similar to that described by Sogannes in his studies on dental problems in aviation dentistry.

In brief, low fusing metal saddles were cast to fit over the posterior teeth. These saddles were filled with impression compound and forced over the posterior teeth. A wire was run between the saddles, and a loop twisted into it, so that the spring scale could be inserted. (Fig. 2.)

The maxillary dentures of six persons were adjusted in the above-described manner, and another series of retention tests were made. These also were made at sea level and 30,000 feet in the manner previously described.

The results of this series of tests are shown in Table 3. No tests were made on lower dentures because difficulty was encountered in finding lower dentures that fitted tightly enough to allow satisfactorily accurate retention tests to be made. It seems logical to assume that

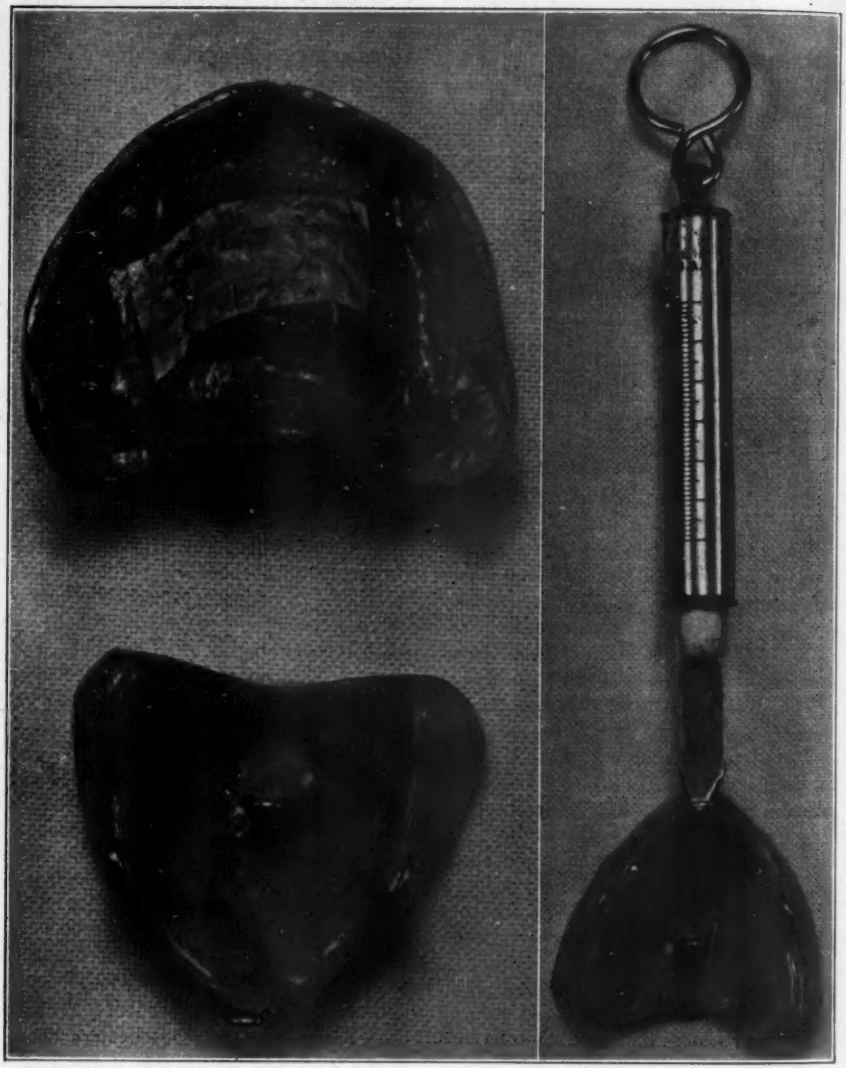

Fig. 1.—Individual acrylic bases with screw eyes to allow for insertion of testing scale.

the findings of these tests would apply also to lower dentures.

RESULTS

It will be noted on consulting Tables 2 and 3 that, in practically all instances, much less force was required to dislodge the dentures at 30,000 feet than at sea level.

In a few instances, indicated by the dagger, the dentures failed to dislodge at all when the full force of the scale,

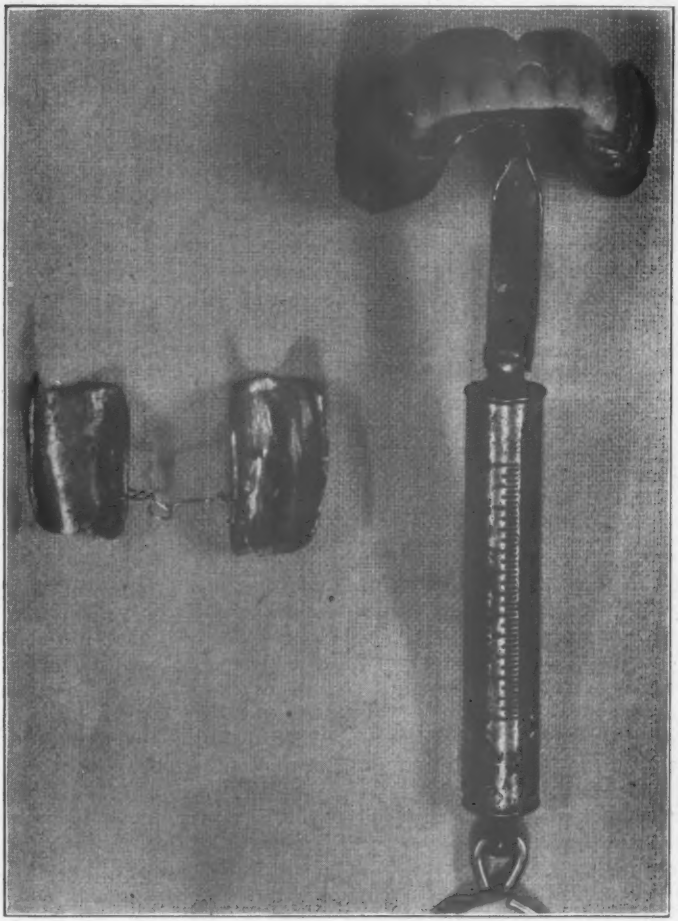

Fig. 2.—Low-fusing metal saddles making possible testing of actual dentures for retention.

i.e., 6¼ pounds, was applied. In those cases, it is of course impossible to draw any definite conclusions. With the remaining cases, a reduction of 70 per cent in atmospheric pressure was followed by an average loss of retention of approximately 50 per cent by both the special baseplates and the actual dentures.

CONCLUSIONS

From the foregoing findings, some definite conclusions can be drawn and suggestions advanced that may serve to aid in establishing the maximum degree of denture retention.

1. Atmospheric pressure appears to be a definite factor in the retention of maxillary dentures.

2. It seems logical to assume that atmospheric pressure also plays a proportional part in the retention of lower dentures.

3. In order to take the greatest possible advantage of that part of retention

produced by atmospheric pressure, it is suggested that, in taking impressions for dentures, the periphery and the postdam areas be fully muscle-trimmed and adapted as closely as possible. Maximum available tissue area should be covered by the impression. Care should be take not to obtain too tight a peripheral seal and produce a pressure atrophy with resultant tissue shrinkage, and consequent air leak and loosening of the denture.

4. The remaining tissue surface of the impression should be adapted with as great a degree of accuracy, and as little tissue displacement and distortion, as possible. Thus, maximum retention produced by adhesion resulting from salivary surface tension is also obtained.

SUMMARY

Under reduced atmospheric pressure, certain bodily physiologic changes occur, such as a decrease in salivation, and a decrease in muscular control.

It is possible that the decrease in salivation may account in a measure for the reduced retention of dentures in these tests. Reduced salivation means less saliva between the tissue and the denture, and hence less adhesion.

It is believed that this is a negligible factor, probably having little or no part in the retention loss. It was noted that when the dentures were removed under reduced atmospheric pressure, their tissue surfaces were just as wet or moist as they were at sea level. Therefore, adhesion as produced by salivary surface tension was undoubtedly still functioning to a major degree.

Adhesion must play a large part in the retention picture, for the loss was not directly proportional to the decrease in atmospheric pressure. (It will be recalled that a 70 per cent decrease in pressure produced a 50 per cent loss in retention.)

Again, it is impossible to come anywhere near a perfect vacuum under a denture. In the cases tested, the average surface covered was slightly over 5 square inches. Since atmospheric pressure at sea level is 14.7 pounds per square inch, theoretically a perfect vacuum on the dentures tested would require 5×14.7, or 73.5, pounds pressure for dislodgment.

Of course, nothing like this degree of perfection can be approached and maintained in the mouth. This is illustrated by the fact that the greatest degree of retention noted was but slightly over 6 pounds, or only about 8 per cent of the theoretical amount possible.

These figures completely neglect the amount of retention due to adhesion. If this is considered also, the degree of efficiency or atmospheric pressure retention drops still lower.

An interesting field is opened in these preliminary investigations, and one that merits further study.

U. S. Naval Air Station.

AN EVALUATION OF THE TRAINING OF DENTAL HYGIENISTS

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THERE has been much discussion within the dental profession and educational groups concerning the training of the dental hygienist. The phrase "insufficiently trained" has been bandied about in dental literature, essays, discussions and meetings without sufficient evidence to support the statement. "Insufficiently trained" has been quoted and misquoted so that statements traced to their origin have proved to be the expression of personal opinion. These opinions indicate a lack of knowledge of the courses for dental hygienists and their curriculums. They lack the basis of fact.

In order to establish a better understanding of the past and present state of education of the dental hygienist, this study was made in comparison with nursing education. For the purpose of conserving space, all comparisons with nursing education have been eliminated and the findings of the study that are concerned with the education of dental hygienists only are stated briefly.

The dental hygienist is registered and licensed in thirty-three states, the District of Columbia, Territory of Hawaii and Puerto Rico, yet she is accorded no national recognition or status in dentistry.

In all the states and territories licensing the dental hygienist, there is a definite statement of subject matter upon which written examinations are based. All states require a practical demonstration of prophylactic technic. A compilation made in 1944 of the state laws governing the practice of the dental hygienist shows that there is a close similarity in subject matter required on state board examinations. Variations in the length of the courses required by law governing the dental hygienist are as follows:

Twenty-nine states require a course of not less than one academic year. Four states require a course of not less than two academic years. The Territory of Hawaii requires a course of not less than four academic years. Two states require eight months internship after graduation from a one-year accredited school. These figures are important for they indicate the basic requirements for schools offering courses for dental hygienists.

The sixteen schools offering courses in dental hygiene far exceed the minimum requirements as stated by law in subject matter. Eight schools have lengthened their courses to two academic years, even though a course of two academic years is required in only four states. Several other schools were prepared to lengthen the course from one to two years when war was declared and have refrained from increasing the content of their curriculums because of the urgent need for trained hygienists to practice in the armed forces. The fact that schools are voluntarily increasing their courses is an indication that they are interested in preparing dental hygienists who are qualified to meet the demands of the growing profession of dentistry, beyond the requirements indicated in the practice acts.

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The first school for dental hygienists was established by Dr. A. C. Fones, in 1913, in his office in Bridgeport, Conn. In 1916, three schools were established: Columbia University, Eastman Dental Dispensary and Forsyth Dental Dispensary. At the present time, there are sixteen schools offering this course in the United States. Only two schools are not directly connected with institutions of higher education. Thirteen schools offering courses in dental hygiene are under the direct supervision of dental schools in colleges and universities. One school is under the supervision of a state college. This school, which offers a two-year course, is located in a state in which there is no dental school. It is evident, from these facts, that the training of the dental hygienist from her very inception as an auxiliary worker in the field of dentistry, has been carefully supervised and regulated by the dental profession.

The courses for dental hygienists present a clear-cut course of training based on an educational program. No school is maintained for its service value to an institution. Courses for dental hygienists in all instances charge tuition equal to that of liberal arts colleges and, in some instances, tuition fees are on the professional school level. The cost of the courses guarantees the student education equal to that outlined in the school catalogs and precludes any attempt to establish a course for dental hygienists to provide service in dental clinics. Tuition for courses in dental hygiene is as follows: two-year courses, $220, in land-grant colleges, to $646 in privately controlled universities; one-year courses, $310 to $492. One Negro university offers the course for $217. In all schools, students are required to pay for room, board, laundry and equipment.

From these statements, we may conclude that dental hygiene education is scaled to the group of students who can afford to enter the liberal arts colleges. The cost of dental hygiene training precludes entrance of students from families of low income groups. This may be interpreted to indicate that the students of dental hygiene come from families of good financial status and consequently should have a good home environment and background.

The original schools of dental hygiene established in 1916 operated for two years with an entrance requirement of one year of high school training. In May 1919, this requirement was raised to four years of academic high school training. All schools at the present time require graduation from an accredited four-year academic course. In most of the catalogs, specific subject matter is stated for admission.

TABLE 1.—DISTRIBUTION OF EDUCATIONAL TIME

Schools offering two-year course	Theory	Laboratory	Clinical
Total hours	518	453	711
Percentage of total training time	38.8	21	48.2
Schools offering one-year course			
Total hours	366	197	506
Percentage of total training time	34.3	18.6	47

A survey of failures in the courses for dental hygienists at Columbia University indicates that, since its organization in 1917, there has been a student loss of 7.2 per cent. Informal inquiries show that about the same rate prevails in other schools, tending to be slightly higher among the schools with the largest classes. This is a very low rate of student loss as compared with that of liberal art colleges and schools of nursing. It is evident that careful selection of students is the rule in every school training dental hygienists; that there is a probability of graduation if a candidate is selected to take this course, and that the investment involved in this type of edu-

cation is sound, as about 90 per cent of the registrants complete the course.

Table 1 indicates the distribution of educational time as compiled from the catalogs of courses for dental hygienists. The percentages are the average of all the schools.

Dental hygiene students spend about one-half of their training time in education and about one-half in clinical practice. As the length of the courses increases, the educational hours increase to a greater extent than the clinical hours. In dental hygiene courses of two years, there is an increase of 205 hours in clinical practice over the one-year course. There is an increase of 154 hours of theory and 256 hours of laboratory over the one-year course. This appears to be a desirable balance of the educational program.

The following list of subjects are those covered in all schools for dental hygienists. The average number of hours in each course is indicated. All schools supplement this basic list with additional subjects, which differ among the several schools. These additional subjects are included in the total hours of lectures, laboratory work and clinical practice in this table.

One-Year Courses

Anatomy and physiology	60.66
Dental anatomy	20.80
Dental anatomy laboratory	62.33
Dental histology	15.16
Bacteriology	19.66
Biochemistry	28.83
Dental hygiene	28.66
Manikin training	83.00
Clinical prophylaxis	363.60
Nutrition	22.83
Child hygiene	19.25
Community dentistry	17.00
Pathology	16.16
Pharmacology	15.83
Radiology	18.50
Child psychology	11.75
Laboratory technics	36.60
Dental surgery, assisting	16.50
Dental health education	22.00
Economics	13.25
Total lecture hours in one academic year	366.33
Total laboratory hours in one academic year	197.66
Total clinic hours in one academic year	506.33

Two-Year Courses

Anatomy and physiology	100.37
Dental anatomy	27.87
Dental anatomy laboratory	107.75
Dental histology	34.28
Bacteriology	35.71
Biochemistry	59.14
Dental hygiene	44.83
Manikin training	84.60
Clinical prophylaxis	457.60
Nutrition	22.00
Child hygiene	21.40
Community dentistry	14.75
Pathology	17.16
Pharmacology	28.16
Radiology	22.42
Child psychology	30.00
Laboratory technics	46.62
Dental surgery, assisting	16.50
Dental health education	57.20
Economics	19.87
Total lecture hours in two academic years	518.77
Total laboratory hours in two academic years	453.57
Total clinic hours in two academic years	711.57

We can conclude from this evidence that courses for dental hygienists have a desirable balance in curriculum among theory, laboratory and clinical practice. If any interpretation of these tables is necessary, it may be said that an important outcome of this investigation shows that the courses for dental hygienists are specifically indicated in school catalogs as to subject matter and class-hour specifications. There is a close correlation among the schools in essential subjects taught. Schools for dental hygienists show a steady progress toward unified standards of curriculums. The ratio of theory to practice in schools of dental hygiene varied from four hours of theory to one hour of practice, to one

hour of theory for each hour of practice in the two-year courses. In the schools offering one-year courses, the variation was even less, showing from one hour of theory to each hour of practice, to one hour of theory to one and two-tenths hours of practice.

In all instances, the faculties of the courses for dental hygienists are about 75 per cent doctors. These instructors were found to be members of the dental school or university staff. In the majority of schools, heads of the departments in which the subject matter falls teach the course. Instructors without degrees are confined to clinical service and commercial subjects. In only one instance was it noted that an instructor taught more than two subjects. This evaluation of the instructing staff is considered significant of the type of education offered in the courses for dental hygienists. "The National Survey of Education of Teachers," Volume 11: "Teacher Personnel of the United States," Bulletin No. 10, 1933, showed that university staffs in general ran as high as 69 per cent with doctorates, while less than 1 per cent have as little education as the clinical instructors in the dental hygiene schools. If there is any criticism to be made concerning these instructors, it is that dental hygienists who are holding clinical instructorships should be encouraged and given the time to continue their education in order to earn degrees in education.

Dental hygiene as a vocation for women, now in its twenty-seventh year of existence, numbers about 7,000 practicing members. Since its inception, there have been increasing demands for more women than are being trained each year. There has never been a surplus of trainees or a problem of unemployment.

In 1927, the American Dental Hygienists' Association was formed. At the present time, it is composed of twenty-six component societies organized by states. Its membership comprises about one-third of the practicing hygienists in the country. It maintains a full staff of elective officers and an executive secretary in Washington, D. C. This organization has formulated the dental hygienists' code of ethics and publishes the *Journal of the American Dental Hygienists' Association* four times a year. The editors of the journal are accepted for membership in the American Association of Dental Editors. It has been responsible for encouraging education for dental hygienists and has been instrumental in advocating that all schools be raised to not less than a two-year course of study. The American Dental Hygienists' Association meets for business and scientific sessions annually at the same time and place that the American Dental Association meets in annual session.

The fields of service offered to the dental hygienist have increased far beyond the ability of the established schools to fill the demand. The Columbia University placement service filled only 16 per cent of the positions offered in the past year. Heretofore, 36 per cent of the calls were filled annually.

CONCLUSIONS

1. Schools for the training of dental hygienists qualify as institutions of higher education. The majority of schools qualify on the university level in curriculum content, teaching staffs and equipment.

2. Additional courses in education, public health and allied subjects should be added to the curriculum for students who intend to enter the field of teaching and public health.

3. One-year courses include too many hours of study for one academic year and should be increased to two academic years with augmented curriculums after the present emergency.

4. There is greater unification of state laws regulating the training of dental hygienists than exists in other fields of health service.

5. On a nation-wide survey, there is a greater agreement in curriculums for dental hygienists than exists in the training schools of other health workers.

6. Further studies should be made of state laws with the idea of recommending that the laws be revised to agree with the entrance requirements of schools training dental hygienists.

7. Dental hygiene as a career for women offers unusual opportunities to those who can qualify for entrance to liberal arts colleges. Fields of service include teaching, public health, institutional and industrial service, civil service and private office practice. In all positions, the dental hygienist works under the supervision of a licensed dentist.

8. Full recognition of the work of the registered dental hygienist as part of the profession of dentistry is necessary if the training program is to provide adequately educated personnel.

9. Each school attached to an institution of higher education should revise its curriculum to meet the educational standards of the institution of which it is a part so that the courses for dental hygienists shall receive full point credit toward the bachelor of science degree.

10. The American Dental Hygienists' Association is the official organization representing the registered dental hygienists and, as such, this organization should be accorded the courtesy of a voice in planning the future educational program for training dental hygienists.

CEMENTOMECHANICAL ANCHORAGE OF GOLD INLAYS FOR THE MAINTENANCE OF BRIDGEWORK

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TO anchor a gold inlay mechanically, and, in addition, effect its retention by the force of adhesion through the process of cementation, was long a painful problem to the dental profession. The force of adhesion, which holds the inlay in position, does not furnish enough retentive power to the inlay to prevent its dislodgment when serving as an abutment in bridgework. Especially is that true when the patient is a habitual gum or caramel chewer.

The inlay can be recommended as an abutment in bridgework for esthetic reasons, but, from the practical side, it is far from a success. Many attempts have been made to remedy this discrepancy, but with little success. During the early history of the gold inlay, pins, posts and grooves were employed to provide more adequate anchorage for the inlay. The posts were used singly or doubly with minor success. The pins or posts only added surface area to the inlay, and thus increased proportionately its adhesiveness. The smooth walls of the posts adhered to the smooth walls of their opposing cavity walls. The cement, in this case, formed a thin medium which served to cement these opposite walls together. Hence, they were held together through the same adhesive force and not through the addition of any mechanical anchorage.

The adhesiveness added to the inlay abutments was not reliable. In order to

prevent the bridge from dislodgment, a mechanical anchorage that would give greater retention to the inlay abutment than the adhesive force could provide had to be devised. To meet this demand, many devices have been suggested. The latest of these were pins placed at right angles to the path of exit of the inlay. These pins are inserted in the buccal or lingual margins of the cavity on the proximal surface, half in the gold retainer and half in the tooth structure.[1] This kind of device gives ideal anchorage, but it is limited in scope to the mesial surfaces only. It is upon the mesial surface that the operator has the freest access to the field of operation, but it is impossible to carry out successfully such operations upon the distal surfaces of posterior teeth.

Fig. 1.—Metallic post employed in securing cementomechanical anchorage.

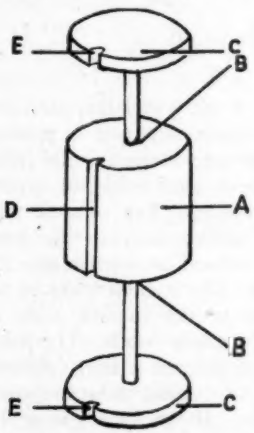

Fig. 2.—Metallic post and component parts.

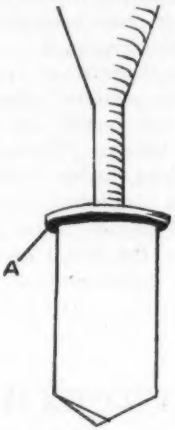

Fig. 3.—Special drill for obtaining post cavity.

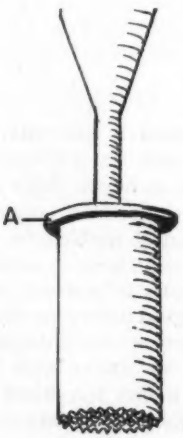

Fig. 4.—Special bur for flattening base of post cavity.

1. PHILLIPS, D. W.: Clinical Aspects of Mechanical Bridge Fixation. J.A.D.A., 28: 732, May 1, 1944.

The kind of device that I am here introducing is inserted on the occlusal surfaces of inlays without regard to the location or complications of the cavity involved. It is, therefore, as easy to insert it upon a distoclusal as it is upon a mesioclusal inlay. This device is embedded in the inlay at the time of casting. It is then cemented to place together with the inlay, after which it becomes invisible. This device is in the form of a post which, when cemented to place, together with the inlay, automatically assures a cementomechanical anchorage. The bulk of cement trapped by this device forms a mass of sufficient

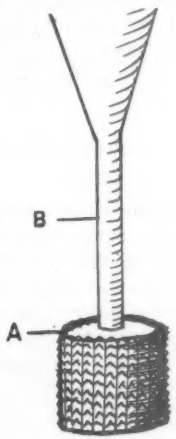

Fig. 5.—Special bur for enlarging lower half of post cavity.

strength, lying at a right angle to the path of exit of the post. This mass of cement forms like a locked fist around the head of one of the pins of the post, holding it firmly in place. The number of such posts for each inlay can be determined by the operator himself, to suit each individual case.

TECHNIC

The following are necessary to the technic employed:

1. A special post (Fig. 1), coming in various sizes as to thickness and only 3 mm. in length. The principle of these posts is the same. They are divided into three equal parts. The central portion resembles a solid cylinder and is one third of the length (Fig. 2, A), 1 mm. The other two-thirds of the post resemble two pins with points entering the cylinder (Fig. 2, B), while their heads are situated on each end of the post (Fig. 2, C). The diameter of the heads of these pins (Fig. 2, C) is the same as the diameter of the cylinder (Fig. 2, A). Upon the external surface of the cylinder and running longitudinally is a groove (Fig. 2, D). The same kind of groove is also found upon each pinhead (Fig. 2, E). The purpose of these grooves will be discussed later.

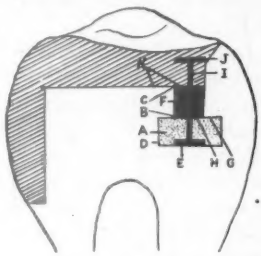

Fig. 6. — Cross-section of tooth showing metallic post in proper position forming cementomechanical anchorage.

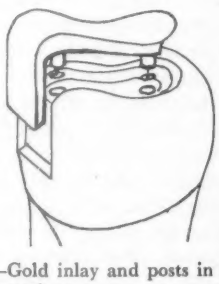

Fig. 7.—Gold inlay and posts in relation to cavity preparation.

2. A drill, the diameter of which should be the same as that of the cylinder, and the length, two-thirds that of the post employed (Fig. 3). At the opposite end of the drill should be a protective shoulder, which should prevent

the drill from penetrating the tooth structure any farther than two-thirds of the length of the desired post (Fig. 3, A).

3. A smooth cylindrical bur, two-thirds the size of the post employed, and with a cross-cut flat base for the purpose of leveling the floor of the cavity produced by the drill (Fig. 4). On the opposite side of the cylindrical bur is a protective shoulder to prevent the bur from penetrating any deeper into the tooth structure (Fig. 4, A). The leveling of this floor will cause the flat surface of the pinhead to rest evenly upon it (Fig. 6, E).

4. A bur one-third the size of the post employed, and with an equal diameter, but with a smooth base and a cross-cut cylindrical wall (Fig. 5). This bur, owing to its smooth base, does not need a protective shoulder (Fig. 5, A). Instead, it has a long, thin neck (Fig. 5, B), which permits the cross-cut wall surface of this cylindrical bur to enlarge the diameter of the lower half of the post cavity, which equals one-third of the height of the post (Fig. 6, D). This enlargement causes the lower third of the post to be situated in a chamber much wider than the diameter of the pinhead (Fig. 6, E), which is the same as the diameter of the post cylinder (Fig. 6, F). The roof of this chamber is formed partly by the overhanging tooth structure or dentin (Fig. 6, G), and partly by the floor of the cylinder (Fig. 6, H). The grooves in the cylinder and in the pinheads (Fig. 2, D and E) are for the purpose of permitting the excess cement to escape from the chamber area (Fig. 6, A).

During cementation of an inlay, there is always a space for the excess of cement to escape, until the two opposing surfaces, that of the inlay and that of the cavity walls, make contact. As regards this post, it is different, for the edges of the two bases, that of the cylinder and the pin (Fig. 6, E and B), meet the upper edge of the post cavity (Fig. 6, C), and thus the surplus cement trapped in the chamber area (Fig. 6, A) and post cavity (Fig. 6, F) is prevented from escaping. These grooves, however, are for the purpose of furnishing an outlet for the surplus cement. When filled in with cement the chamber forms a solid block, which locks the upper portion of the tooth structure (Fig. 6, G) with the pinhead of the lower portion of the post (Fig. 6, E). The thickness of the cement block in the area between the pinhead and the cylinder is one-third that of the post, minus the thickness of the pinhead. This cement block forms the mechanical anchorage. It is the cement volume and not its adhesive property that anchors the pinhead and keeps it in position (Fig. 6, A). If we employ a good cement, the stability of this anchorage is unquestionable.

UNION OF THE POST WITH THE GOLD INLAY

After preparation of the mesioclusal or distoclusal cavities, in an area on the floor of the cavities remote from the pulp area, the drill (Fig. 3) is allowed to sink into the floor of the cavity as far as it can go, and then the floor of this newly formed cavity is leveled with the special bur (Fig. 4). When this is accomplished, the proper post is inserted (Fig. 1), with each end in the cavity. Thus, one pin and the pinhead of the opposite side of the post project into the cavity of the inlay (Fig. 6, I and J). The floor of the cavity forms a straight surface with the upper surface of the post cylinder (Fig. 6, K). Now, the wax pattern of the gold inlay can be produced, either by the direct or by the indirect method.

DIRECT METHOD

The wax is pressed into the tooth cavity, engulfing the projecting head of the post (Fig. 6, J). This enables the wax pattern to withdraw the post with it when it is removed from the cavity.

With the direct method, care should be taken not to clog the grooves of the cylinder (Fig. 2, D).

INDIRECT METHOD

The rod, with each end in the cavity of the tooth specially prepared for it, is put in place. This will leave one pin and pinhead of the rod to project into the cavity of the inlay. A copper band, with the same circumference as that of the crown of the tooth involved is filled with impression material and an impression of the case is taken. A case of investment compound is now run. Wax is placed in the cavity of the investment compound, trimmed and adjusted and, together with the investment-compound cast, reinvested and cast. As soon as the gold inlay is obtained with the metallic post or posts in proper position (Fig. 7), the inlay is placed in the tooth cavity for adjustment. The inlay is then removed from the cavity and, with the special bur (Fig. 5), the inner half of the cavity is enlarged, forming a wider chamber (Fig. 6, A). It is in this chamber that the cementomechanical anchorage of the gold inlay takes place. The gold inlay is now ready for cementation, or to be used as an abutment in bridgework. Similar methods of procedure can be applied to the acrylic inlay.

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TUBERCULOUS SCROFULODERMA

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IN spite of the advances in oral diagnosis and therapy of recent decades, we are still confronted with many conditions that may present perplexing problems. Tuberculous scrofuloderma, although not very frequently observed, may readily be included in this group. In this paper, discussion will be limited to involvements emanating from oral foci.

Scrofuloderma of tuberculous origin may start as a granulating ulcer surrounding the orifice of a sinus leading down to a tuberculous gland or a focus of bone tuberculosis. The tubercle bacillus may be recovered from the lesion, but, most often, one finds a mixed infection, which may spread subcutaneously, sometimes involving an extensive portion of the face or neck. It is an extremely resistant lesion and may persist long after the original exciting focus has disappeared. Before the cutaneous tissue breaks down, the lesion usually has a purplish hue. On healing, it often leaves heavy cicatricial formations.

I have found one method successful in the treatment of this lesion. The exciting focus, if it be an impacted tooth or a periapical or residual infection area, certainly must be removed. The cutaneous lesion is then subjected to grenz ray treatment. The grenz ray is a borderline ray, in the category of a soft x-ray. It is found in the spectrum about half-way between the x-ray and the ultraviolet ray. The latter is too superficial in penetration to be of any therapeutic value for this lesion. The x-ray is too hard, and too little of it is absorbed where desired. Large doses of the grenz ray can be employed with no deleterious effects. It exerts, it is believed, a tissue-cell stimulation which permits sufficient local antibody forma-

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tion to overthrow the invading organisms, as well as to assist in establishing a normal physiologic action of the irradiated tissues. (In a spectroscopic study of the capillaries of the web of the hand after grenz radiation, which I am conducting in collaboration with an endocrinologist, the evidence may point to the radiation effect as causing a change in oxygen tension in the tissues.)

Following is a brief résumé of several cases of scrofulodermatous conditions:

REPORT OF CASES

W. L., a man, aged 26, admitted to Sea

Fig. 1.—Roentgenogram revealing presence of impacted, unerupted mandibular third molar, lying in horizontal position. This was the source of a tender mass which formed at the angle of the jaw.

View Hospital with a caseous pneumonic lesion of the right upper lobe, with multiple cavitation, a tuberculous lesion in the sacroiliac region, and one in the spine, shortly after his admission developed a small localized tender mass over the angle of the left mandible. His Gaffky scale was V, which indicated a positive sputum for the tubercle bacillus. Roentgenographic examination revealed an impacted, unerupted lower left third molar. (Fig. 1.) There was also present an unerupted, impacted lower right third molar. The left molar was removed, and the socket slowly filled with healthy granulation tissue. The tender mass at the angle of the jaw, however, continued to spread superficially, involving the cutaneous tissue. (Fig. 2.) An incision for drainage was made, but the lesion failed to heal. The

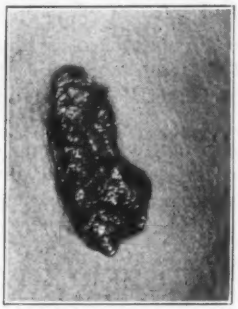

Fig. 2.—Elevated granulomatous formation which developed from tender mass at angle of jaw. The infection crept upward until it reached the cutaneous tissue just under the lobe of the ear on the cheek.

Fig. 3.—Extension of lesion cutaneously with disappearance of hypergranulation tissue. The tip of the lobe of the ear can be seen in the upper right corner.

purplish coloration persisted. The condition was further complicated by involving Stenson's duct and creating a fistulous opening on the face over the scrofulodermatous area. This constant secretion tended to irritate

the lesion and impeded healing. (Fig. 3.)

The lesion was subjected to grenz radiation therapy and responded favorably. Gauze dressings placed over the wound quickly became saturated from the salivary fistula. Hence, a thin layer of vaselin was spread over that part of the lesion, and the dripping saliva passed over the area without affecting it. The entire lesion was protected by a small metal bridge (Fig. 4) spanning the lesion, held in place with adhesive tape and lightly covered with gauze to protect the wound and permit its aeration. A plastic operation was planned to bridge the fistulous orifice intra-orally, but contraction of the wound effected spontaneous closure. Several subsequent grenz ray treatments of the scrofulodermatous lesion resulted in complete healing.*

Several months before admission to the hospital, the patient developed an acute periapical involvement of the upper left second bicuspid. A sinus to the cheek developed, terminating in formation of a scrofulodermatous lesion. (Fig. 5.) Grenz-ray treatment was instituted for this lesion, but the patient died from a generalized hematogenous spread of the disease before adequate therapy could be employed.

J. M., a man, aged 49, was admitted to the hospital with a history of a unilateral pulmonary tuberculosis, a plus four Wassermann reaction, with evidence of early cerebrospinal syphilis and a positive sputum.

The inferior left cuspid which manifested a chronic periapical infection, possibly a tuberculous periapical granuloma, developed a sinus to the left submaxillary region, where

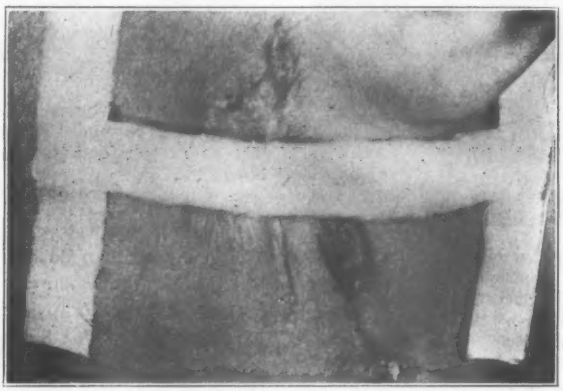

Fig. 4.—A small metal bridge held in place by means of adhesive tape (not resting on lesion) which supported gauze dressing protecting area, but not coming in contact with lesion. Thus the dripping saliva from the salivary fistula did not wet the gauze, and hence the change of dressings was required much less frequently, at the same time permitting aeration of the lesion.

The other impacted molar was removed, with uneventful recovery.

K. S., a woman, aged 37, entered the hospital with a diagnosis of bilateral pulmonary tuberculosis with a large cavity in the right upper lobe and extensive involvement of the left upper lobe, tuberculosis of the left maxilla and a tuberculous larynx. The sputum was strongly positive. Prognosis was very poor.

a scrofuloderma developed. (In a study conducted by me, periapical granulomata in 362 tuberculous patients were studied by means of pathologic sections, and 8 per cent manifested tuberculosis.[1]) The involved tooth was removed, and the scrofuloderma treated by means of the grenz ray. (Fig. 6.) After the skin lesion had healed, there was a deep depression, with heavy cicatricial formations. This was corrected by a simple plastic operation, padding the depressed area

*Capt. Morton E. Bernstein (DC), AUS, formerly dental resident at the Hospital, assisted in this case.

1. BRODSKY, R. H., and KLATELL, J. S.: *Am. J. Orthodontics*, 29:498, September 1943.

with fat tissue taken from the adjacent submaxillary region.

CONCLUSION

There is comparatively little in the literature on the subject of tuberculous scrofuloderma. Several cases that have been photographed have been selected in order to acquaint the reader with this disease entity. The lesion is not a very common one. It is highly resistant and not amenable to the usual methods of treatment. After the exciting focus of the lesion is removed, the disease process, I have found, can be not only checked, but also actually cured by means of grenz-radiation therapy.

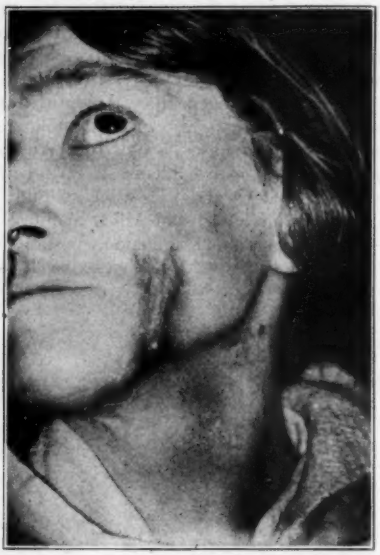

Fig. 5.—Typical scrofulodermatous lesion of cheek resulting from periapical infection of upper left second bicuspid from which sinus developed to cutaneous tissue. The lesion had the usual purplish hue.

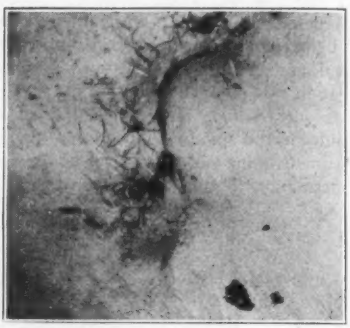

Fig. 6.—Scrofuloderma in left submaxillary region which responded to grenz-ray therapy. The patient was both tuberculous and syphilitic.

14 East Eighty-First Street.

DENTISTRY'S PLACE IN POSTWAR PLANS: ESSAYS FROM JUNIOR MEMBERSHIP CONTEST

I*

DON M. ISHMAEL

IN preparing postwar plans, one must utilize his knowledge and experience of the past coupled with realistic imageries of the future. A goal must be assumed and a method of attaining that goal must be outlined. Corroboration of the problems to be encountered must be expressed. An insight into the solution of these problems should open the road toward our ultimate goal.

An assumption, then, based on the past and stimulated by dreams for the future, that our goal should be prevention is only logical. Prevention in dentistry entails problems of great complexity. For brevity, these problems are outlined as concerning:

A. Knowledge of facts regarding:
   (a) Caries.
   (b) Periodontoclasia.
   (c) Malocclusion.
   (d) Surgery.
   (e) The patient *in toto*.
B. Dissemination of dental truths regarding:
   (a) The individual.
   (b) Diagnosis and prognosis.
C. Economic problems:
   (a) Handling needs of low income group.
   (b) Time versus returns.
D. Conscientiousness in:
   (a) Fulfilling child's needs.
   (b) Placing individual's welfare above monetary returns.
   (c) Spending after work hours in research.
E. Availability:
   (a) Need for more dentists, hygienists and technicians.
   (b) The too great scope of nation-wide requirements.
   (c) Demand for men doing research only.
F. Rehabilitation of dentists leaving the service.

At this writing, the possibility of prevention of decay is not fully recognized, but we realize that steps toward preventive measures are rapidly being taken and postwar dentistry may well utilize means for caries prophylaxis. Through the work of our eminent research workers, we are coming closer and closer to the actual prevention of caries, periodontal disease and even malocclusion. A great advancement was realized recently when, through the use of sodium fluoride and related drugs, desensitization was made possible. The foundation certainly has been laid for the eradication of all pain in dentistry. The pain hazard in operative and surgical dental operations was overcome in great measure by the introduction of local and general anesthetics—and now ubiquitous potential pain may be relieved by the application of fluoride. These great problems in prevention today are, for all practical purposes, solved!

Dentists in uniform engaged in the surgical treatment of war casualties are learning much in the handling of face, head and neck wounds and the rehabilitation of those so injured. Working side by side with the orthopedic, the plastic and the general surgeon certainly will embue the dental surgeon with many technics concerning maxillofacial surgery. To quote a section from "Dental Care," in "Health of the Armed Forces," speaking of naval dentists, "Those who specialize in maxillofacial surgery are sent to the Mayo Clinic for study. This

*Prize essay from the Baylor University College of Dentistry, Dallas, Texas.

Don M. Ishmael.

work of restoring facial structure damaged in battle may include plastic surgery also, and has an important place in service plans for rehabilitation of service men after and during the war."

Another striking problem confronting postwar dentistry is patient psychology, or knowledge of the patient *in toto*. The dentist of the future must have a basic understanding of human personality so that he can better educate his patient regarding the cause and effect of dental diseases. The well-trained dentist of the future must know how to conquer fear, abolish lack of confidence, acquaint the patient with the nature of his dental ailments and in general have a complete understanding of human nature. To quote E. R. Swank: "Let us overhaul our procedures and armamentarium and put more romance into our work of proper and efficient patient education, appealing more to those basic human and psychologic wants: personal appearance, comfort and security, self-esteem, happiness and pleasure.

"Then we will attract a greater number of patients to our offices. Thus will preventive dentistry assume its true role and destiny rather than merely existing for the purely mechanical correction of dental syndromes."[1]

In order to educate the patient in preventive measures, methods of propagating dental truths must be propounded. "A concentrated educational program sponsored by the organized dental societies, telling the public of the benefits of dentistry, could, within a few months or even weeks, convert the American people to the ideals of preventive dentistry."[1] In the past year, the Public Relations Committee of the Council on Dental Health of the American Dental Association, in cooperation with the Bureau of Public Relations, has made worth while progress in this subject.

Much depends on the individual practitioner also. After a proper diagnosis has been rendered, through clinical observation and x-ray examination, the patient should be fully informed as to all corrective measures needed, not just that measure necessary to overcome the ache or pain that brought him in. In the past, all too many practitioners have been reluctant to inform the patient of such needs because of a loss of time and subsequent loss of remuneration. The problem of time versus returns, however, is diminished in light of the fact that informing the patient is merely time spent in "sales effort." The dental profession must improvise a method whereby all dental service can be rendered at the lowest cost consistent with adequate quality.

The economic problem, however, will lend itself more nearly to a solution when the needs of children, indigent and others, are provided for. It is common sense that dental prevention should start with the child. It has been suggested that the average cost of keeping school children's teeth in good repair would be approximately only $4 a year and would take only one hour of dental service time per child per year.[2] Plans must be made for an allocation of the necessary sum to institute a program to provide for the dental care of children.

1. Swank, E. R.: Practice Building in Dentistry Through Patient Education. J.A.D.A., 31:41, January 1, 1944.

Since, in 1940, there was only one dentist to each 1,600 persons in the total dental population,[2] and since postwar dentistry will place even greater demands upon a small number of dentists, there is dire need for more and better trained dentists and dental assistants (the hygienist and technician); the assistants not to assume any duties of the dentist, but to lighten his load. If the dentist's load could be lightened, more time could be spent in research and enlightenment. To keep abreast of the times in the ever-changing world of tomorrow will require the utmost in diligence and persistence.

In addition, there must be in plentiful numbers those who will devote their sole time to experimentation and research to forward the already "set" precedence.

The final problem for consideration is the rehabilitation of dentists leaving the service. About 20,000 dentists will be released after the war, to return to civilian practice. There will certainly be a need for refresher courses to offset the lack of training in certain branches arising from their infrequent practice in the armed service. A study of the reorientation of those men requiring such training should be a part of postwar planning.

2. Treloar, A. E.: Survey of Needs and Services Available for Protective Dentistry for Indigent Children and Youth in U. S. A. J.A.D.A., 31:326, March 1, 1944.

II*

IRVING A. GREENBERG, B.A.

THERE is the old story of the ostrich who thought that, by burying his head in the sand, he would avert the catastrophe about to befall him. Let us not simulate the example of the ostrich in the imminent postwar problem that confronts us—socialized dentistry. The fact that such a bill as the Wagner-Murray-Dingell Bill has finally been given form indicates that a new type of public health service is an inevitable eventuality. How then are we to deal with this question? Should we attempt to stem the tide, only to be engulfed in a bureaucratic administration which shall execute this law without consulting the profession and thus lead to our complete subservience to a committee of politicians totally ignorant of our needs and desires? This is the alternative that we face if we endeavor to feebly pit ourselves against this force rushing toward socialization.

However, we can follow another path: We can become cognizant of the inevitability of this new system coming into effect and, with this in mind, we should cooperate with the legislators interested in the bill and thus bring about a channelization of the provisions to gain a maximum furtherance of our own interests. In this way, we could ascertain that any administrative committee formed would have the American Dental Association well represented and in such strength that formulation of policies would be directed by the Association representatives, who would be entirely aware of the profession's problems. This, then, would be the road toward making the best of an undesirable situation. It is the intelligent method and should be given the careful consideration of every member in the profession and the executives of the American Dental Association.

There are other major problems which demand efficient handing in the postwar world. The question of reallocation or distribution of dentists and of raising the caliber of scholarship of the students accepted in future classes may be combined under one plan, which I shall outline below.

Dental educators and members of the profession all bemoan the lack of properly qualified students applying to dental schools and attempt to blame the lack of publicity regarding the advantages of the profession. However, let us explore this situation from an

*Prize essay from the School of Dentistry, Western Reserve University.

Irving A. Greenberg, B.A.

entirely different angle. Undoubtedly, a dental education is one of the most expensive, and since the curriculum excludes the possibility of outside employment to any great degree, the field of students that can apply has automatically been delimited. This is the crux of the situation. If we could draw students from this excluded majority, we might have the answer to the problem. Why, then, could not the American Dental Association with government backing, for financially this could not be privately undertaken, conduct dental aptitude tests both manipulative and mental throughout the country's colleges to determine the scholastic desirability of *all* who wish to enter dental school? Using this as our basis of selection, we could pick the cream of each year's crop of eligibles.

At this point, the government would take over with the following plan: It would offer to all selected students, financially unable to pursue a complete dental course, a chance to continue their course at the government's expense, conditional on their maintenance of the high standards which the aptitude tests showed them capable of. In return, the student would be obliged to practice for five years in a "dental health deficient" area that the government would designate. After his five-year period expired, the dentist would be free to do as he pleased. He could either remain in the area and keep the office that the government had supplied him with, or open a new office of his own in any area in which he desired to practice.

The benefits of a system of this sort are self-evident: First, it would open the field of dentistry to much greater numbers than ever before, with the result that the unqualified "self-paying" students who were admitted to fill school quotas previously would be replaced by government-financed qualified students, a procedure leading to classes of a superior grade. Second, areas that had been in sore need of dental care would be supplied with dentists of high caliber, who would tend to remain in the area after their five-year period owing to the fact that, by that time, they would have built up a practice and would be prone to leave it and start anew. This, then, would answer the problem of the concentration of dentists in the large cities and their utter absence in rural districts.

Another phase of postwar planning must include a study of the dental school curriculum. With the great amount of work being done toward prevention of caries, our hopes are rather high that fluorides, injections or other means shall help us conquer dental caries. Then what? Restorative procedures will suffer a decline. We must prepare for that day in our school curriculum. Greater stress should be put on oral pathology and diagnosis. The dentist of tomorrow shall require this knowledge, for he will deal chiefly with oral lesions, surgery of the oral cavity and orthodontics. True, we shall have to continue learning the manipulative end of our profession, for this generation is in dire need of restorative work, but we must have an eye to the future and be ready for the transition.

These, then, are but a few indications of what postwar dentistry shall be expected to deal with, both externally with socialized medicine and internally with its trends toward dental caries prevention. Dentistry can, therefore, select its road toward a greater and more important health service for all, or it may become decadent, staying con-

fined within the four walls of the office of every dentist, who will smugly wait to see what will happen, because these changes will not affect him any more. The students of today will be affected and they send out a plea. Which road shall it be?

III*

ROBERT E. BAKER

AMERICA! That one word symbolizes so very much, but to me it means one thing more than any other. That is the right for an individual through his own initiative and diligent work to strive for the top in a business or a profession in a thoroughly free and soundly happy manner. This American way of life has been unequaled in the past, and it is this way of living, for which my friends and brothers are now giving their all, which has produced the finest men in most of the arts and sciences. This does not exclude the dental profession which has attained the highest state of perfection in our own land.

If these statements are considered to be the truth, then it may be assumed that the free, able, unhindered man with initiative is the man who will excel, and, therefore, the free, able, unhindered dentist with initiative will be the most excellent dentist.

The dental profession has always striven to uphold its high standards, and its aims have always been to do the most possible to benefit the people. It has been true that many people have not had dental care, but it is my belief that the guilt lies not in the dental profession, but in the public itself. These people have not obtained dental help because they did not know its purposes or its advantages. It might also be considered that the lack of dental men in a locality was a cause for the lack of dental service. It is also my belief that there are few dentists who do not follow the Golden Rule, and who do not do much charity work without any other living soul knowing of the kindness.

Since the trend of thoughts of the members of the dental profession has been deeply affected by the tragedy in which our country is now involved, it is only fair to the profession and to the public that a postwar plan be adopted which will be the most feasible and of the greatest benefit to all.

There are two halves which must enter the situation, and these two individual parts must integrate and form a cooperating unit.

As dentistry is under discussion, it is logical that the first half of the unit shall be the dentist and the dental profession as a whole. The dentist and his brothers must strive unceasingly to maintain dentistry on the high plane that it has been on, and to reincorporate those members of the profession now serving with the armed forces into civilian practice. The main and supplemental dental organizations and societies must operate vast educational programs to acquaint the returning dentist with new advances and new and varied technics. The dental societies, in cooperation with the leading dental organization, should establish a method of relocation of these returning dentists. It must be shown to these men that there are various communities where dentistry is most needed and where they may serve for the best of all concerned. The combined dental organizations and their men must advance the dental education of the public. I agree with those who say that the people returning from this war will be more interested in dental health than ever before because of the excellent and varied work being done in the armed forces, and, with this incentive and by means of extensive special courses on hygiene, prevention, preventive dentistry and restorative dentistry, the public can at last begin to comprehend the scope of the dental profession.

*Prize essay from the University of Minnesota, Minneapolis.

Robert E. Baker.

The entire plan being presented depends on the second half of the unit, which is, of course, the public itself. The American public was responsible for establishing our proven way of life, and it must be the American public who shall maintain it. After the national emergency, the public must restore the freedom which we now are at war to preserve, and this means the restoration of freedom for every man, not just the laborer, not just the farmer, nor the capitalist alone, but freedom for every one. It has been said that all men are created equal, and it has been proved that some men are more talented in certain fields than others and in those fields the talented belong, each according to his capabilities. Individual initiative would then lead to success. If a bureaucratic, socialistic scheme were devised by which the professional man would become a tool of the politician, and the profession a political organization, it can be readily seen, I believe, that the standards built on initiative and ability would be destroyed.

The public must not only be instrumental in restoring and maintaining freedom, but they must also have a desire to obtain an education, including dental education, because, without this desire, the country, and the world itself, cannot forge itself into a peaceful and pleasant place to live in.

To summarize: The obligation of the dental profession to the public is first to maintain the dental profession at high standards by furthering the education of its members; second, to relocate the returning dentists where they can best serve, and, third, to educate the public on dental health. The obligation of the public to the dental profession is to keep the freedom which we have been accustomed to, and to learn about the advantages of dental care.

IV*

WILLIAM R. PLOSS†

ALL postwar planners, whether designing domestic postwar patterns or planning on an international scale, recognize the importance of the well-being of the masses of people in any given country, and provision is usually made in their plans for further extension of existing public health measures. Dentistry has a definite position and a definite responsibility in any and all postwar plans. Three major groups (more or less concentric) in the profession: organized dentistry as a whole, the dental schools and the dentist himself, are concerned with their respective places in our postwar world. In all peace plans, there are always considerations of an immediate nature, those which make peace planning in time of war expedient, and considerations of

*Prize essay from the University of Buffalo School of Dentistry.

†Private first-class.

William R. Ploss.

long term nature, those more idealistically based and intended to avoid further conflicts in the future.

The most important phase and one requiring prompt consideration is the problem of mental and physical rehabilitation of the war-wounded. The oral surgeon and prosthodontist are directly concerned with the treatment of facial injuries. Although these will, in the main, be the problems of the medical and dental departments of the armed services, the private practitioner also will meet many such cases.

The dental schools of our universities will play a major part in the education of discharged servicemen inducted before they had any opportunity to begin specialized training for their vocations. At this time, there is some promise for government subsidization of college training for this group.

A serious problem for organized dentistry as a whole, as well as the private practitioner, will be the return of the dentists now in service. The majority of the young dentists graduated from the dental schools of this country in the past three years have never practiced privately. This group will have to locate, and meet all the problems of setting up a practice, immediately upon reaching home. The three problems stated above constitute the immediate problems in relation to dentistry in postwar planning.

Present plans for peace are also concerned with certain long-term changes in our social system which include radical extension of public health service under government control. The need for such extension in the United States can hardly be denied, but methods for this expansion must be properly evaluated. Of 3,070 counties in the United States, 1,401 (practically all rural) had no full-time health service in 1941, and fewer than fifty had adequate finances or personnel. Large areas, some with populations up to 5,000, had no medical service at all.* This not only demonstrates the need for further service to a large group of our people, but also indicates the necessity for a migration of public health personnel, including dentists, to rural areas. The lack of economic enticement in these rural areas is probably the strongest argument in favor of government-subsidized public health services. In this direction, the Farm Security Administration, as a part of its rehabilitation program, already has a modified health service system in operation in certain rural areas. We, as professional men, do not want political control of health services to precipitate poorly managed and red-tape-ridden bureaus. In postwar plans, there is this opportunity for locating war-trained dentists in such areas where they are needed, on a voluntary basis. These men should have their choice of carefully appraised localities.

Certainly dental education will make greater progress in the postwar world. New technics developed during the war, both in teaching itself and in the diagnostic, restorative and surgical divisions of dentistry, will find their way to the dental classes of the future. Dental schools should provide adequate postgraduate courses in advanced technics, opening them especially to men returning from the service. The dental schools have an important responsibility in readjusting the dental officers now in service to their peacetime practices.

In summary, dentistry's place in postwar plans can be outlined as follows:

The dentist's most urgent place in any postwar plan is as an aid in restoring war wounded physically, and often mentally, to normalcy.

*From the 1943 report of the War Resources Planning Board.

An almost equally urgent need for definite planning arises from the prospect of many dentists coming home to establish or reestablish practices. This problem is dentistry's problem. The profession should show organization enough to plan voluntary relocation of dentists by surveying the need throughout the country.

Dentistry's most important place in postwar plans is its part in a new and broadened public health service of this country. Since any such expansion of the present service will necessarily uncover complex problems of a dental nature, organized Dentistry should lead the way. The problems bound to arise will require special recommendations, which only the dentists can answer from experience.

Dentistry will have, as shown above, increased responsibilities to the people in the future. Besides maintaining and extending dental care to the people on a private-practice basis, it is Dentistry's liability to educate the masses to a consciousness of dental care. Advertising by the profession as a whole, in general terms and in an educational vein, can hardly be considered unethical.

Dental education should be further developed in the postgraduate field. There will be a definite demand from the profession for such courses.

Dentistry's place, then, is outlined by a greater and more definite responsibility to the people, a broadening of its educational and service phases and, as a result, a greatly enlarged and more firmly established profession.

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FURTHER TESTIMONY IN HEARINGS ON NAVAL DENTAL BILL

The CHAIRMAN. Of course we all understand that you are part of the Bureau of Medicine and Surgery, established by statute as a Dental Corps.

Dr. MEAD. That is correct.

Mr. COLE. Do I understand there is presently a head of the Dental Corps in the Medical Department?

Dr. MEAD. No; not in the Navy.

The CHAIRMAN. Yes.

Mr. COLE. The doctor says no.

Dr. MEAD. You do not have the same set-up as you have in the Army. You have a division, and the man appointed to that division does not direct the dental activities of the Navy, and they have nothing on the record——

Mr. RIVERS. Yet they tell this committee that was the fact.

Dr. MEAD. If they are placed in the dental service, why do not they put that on record? There is nothing on record.

The CHAIRMAN. The Dental Corps would function just as efficiently as an adjunct of the Medical Department; is not that correct?

Dr. MEAD. No, sir.

The CHAIRMAN. Do you mean to represent to the committee that the 5,000 dentists in the Navy today are not functioning efficiently on account of the present set-up; is that correct?

Dr. MEAD. They are not functioning to their full efficiency; let us put it that way.

Mr. MAGNUSON. On what is that conclusion based? Let us get down to the point: The truth of the matter is the Dental Corps wants some more recognition in the Navy than they are getting now?

Dr. MEAD. No; they have recognition, but without authority. You gave us a rear admiral, and is not that recognition? What we want is to get the benefit of that.

The CHAIRMAN. You are asking for authority?

Dr. MEAD. We want authority; that is right.

The CHAIRMAN. Now, what you are complaining about is that you do not have the authority that you want today?

Dr. MEAD. That is right.

Mr. RIVERS. In keeping with medicine and surgery.

Mr. MAGNUSON. That is the meat in the coconut.

Dr. MEAD. The meat of it is efficiency in the dental service.

Mr. MORRISON. Is there any contention that it will injure the service?

Dr. MEAD. I do not see how there could be.

Mr. MORRISON. I mean is there any such contention?

Dr. MEAD. I have not seen any.

Mr. MORRISON. So, if this recognition was given to the dental profession, there is no contention it would hurt the service?

Dr. MEAD. I have not seen anything in that line.

The CHAIRMAN. You think it will increase the efficiency to have more authority?

Hearings before the Committee on Naval Affairs, House of Representatives, on H. R. 4216.

Dr. MEAD. Certainly. I think that is self-evident.

The CHAIRMAN. Do not you think it is incumbent upon you to show how the efficiency is going to be increased by having more authority?

Dr. MEAD. Yes.

The CHAIRMAN. Well, how?

Dr. MEAD. I can cite any number of instances. The dental officer will see there is going to be an increase in his station and there will be a demand for more dentistry. He is sometimes consulted with regard to the buildings and planning; then they do not, in many instances, accept at all what he suggests the buildings ought to be. In many instances they build them without any water or electricity for the dental department; then, when they get down to it, they find they do not have any way of installing it, and the result is the rooms are without water, and so forth.

The CHAIRMAN. At what place has that been done?

Dr. MEAD. It has been done in a number of places.

The CHAIRMAN. In what places has it been done; put them in the record.

Dr. MEAD. Take Pensacola.

The CHAIRMAN. What happened at Pensacola?

Dr. MEAD. They do not have sufficient dental installations to take care of the amount of work they are doing, and they do not have the type of planning that would be for the best interests of dentistry. And that happens at all these stations.

The CHAIRMAN. Then the architects, in drafting the plans, have not consulted the dentists?

Dr. MEAD. They consulted the dentists about this bill, no doubt, but nothing happens after the consultation.

Mr. MORRISON. Your contention, as I understand, is that the practice of dentistry in the Navy would be better exercised by a man who knew something about it, than by one who does not?

Dr. MEAD. Certainly, and a man who knows something about it should have the authority.

Mr. MORRISON. And that this authority is now exercised by a physician, instead of a dentist?

Dr. MEAD. That is right.

Mr. MORRISON. And you want dental authority and competency substituted?

Dr. MEAD. We want a direct approach to the commanding officer of the ship, station, or hospital, no matter whether he is a medical officer, a line officer, a supply officer, or anything else. The dentists want a direct approach to the commanding officer of the installation.

Mr. MORRISON. If that is done, what change will it cause or what damage will it do to the medical organization?

Dr. MEAD. None; no damage; it will be an improvement, or we would not be here taking up your time.

Mr. SASSCER. As it happens now, an officer of the Dental Corps, senior to an officer in the Medical Corps, has to take orders, etc., from a junior medical officer?

Dr. MEAD. In all cases, except at Bethesda, where dentistry has what it wants. In all other cases, the dental officer may need supplies and make a requisition, and it has to go to the commanding officer immediately above him. He may be inferior in rank. You may have a case where a lieutenant in the Medical Corps is in command, and we may even have a rear admiral in the Dental Corps, and he would have to take his orders through the lieutenant in the Medical Corps for supplies he ordered. That is a far-fetched theory, but it is not farfetched to say there are captains and commanders in the Dental Corps who believe they need certain supplies, and that requisition has to go through the medical officer, and he can either turn it down or forward it, as he desires.

Mr. SASSCER. In other words, a junior medical officer could either approve or disapprove?

Dr. MEAD. That is not only as to supplies, but as to everything. It pertains to efficiency ratings. I may have a training station and may have eight times as many dental officers as there are medical officers, and these men may seem more efficient than others, and I may desire to rate them and would rate them. But if as a dentist I rated them, I have no control over the rating; it must go through the medical officer immediately over me, and he may change it up or down, one way or the other, and I would never know about it.

Mr. SASSCER. Although he may be a junior officer?

Dr. MEAD. That is right. But the fact he is a medical man puts him over me.

Mr. SASSCER. What about discipline?

Dr. MEAD. Everything. It is the same way all along the line; the medical man controls the dental man.

Mr. MAGNUSON. Doctor, you do not want this record to convey the inference that the Dental Corps of the Navy is not performing efficiently now, do you?

Dr. MEAD. The Dental Corps of the Navy is producing the most satisfactory service in the world; but you have 5,000 of the best dentists in the United States in the Navy and they ought to be functioning at peak, and those men will go out of private practice and do in the Navy in a day what they would do in one hour in private practice. They do not have the installations, equipment, and morale, and what goes with it, and they are not functioning at peak efficiency.

Mr. MAGNUSON. I understand that, but you do not want this record to show—and I think there is that inference here—that the Dental Department of the Bureau of Medicine

and Surgery is not performing efficiently their duties, do you?

Dr. MEAD. That is right; but we want peak efficiency.

Mr. MAGNUSON. But your contention is, if this is done, they will probably be more efficient; is that right?

Dr. MEAD. That is correct.

The CHAIRMAN. Do you mean to tell the committee that all the facilities are not available for treating naval personnel in the service, in the Dental Corps, that are necessary to protect their health in connection with dental work?

Dr. MEAD. That is true.

The CHAIRMAN. Now that is a very important statement. Wherein is the Bureau of Medicine and Surgery failing to provide sufficient equipment or sufficient dentistry matériel to accommodate their personnel?

Dr. MEAD. Because they do not give dentistry the authority to take care of their own affairs. They are being run by a department that does not know anything about dentistry.

The CHAIRMAN. Doctor, do you not think you should enumerate for the record specific instances where the Medical Department has failed to furnish to dentists the equipment, space or matériel to take care of the enlisted men?

Dr. MEAD. I could furnish many of those, but I would not do that, sir, because those men would resent it. They cannot come here and fight for themselves. You may say "Oh, we welcome those things," but there are lots of ways it would go against their record. I would hesitate; I can give you plenty of instances, any number of instances you want, about those matters.

The CHAIRMAN. Then the committee can understand that the Bureau of Medicine and Surgery is falling down by failing to furnish the Dental Corps with the material and whatever is necessary to afford proper dental care to its enlisted or officer personnel?

Dr. MEAD. Now, Mr. Chairman, there are many installations where you have favorable medical officers, and where the dental officers can maintain favorable conditions even with the present set-up, and function perfectly, and there are many others that do not. It is all at the whim of the medical officer who is in charge. There are lots of supplies, of course, many instances, where supplies are needed, that the right supplies do not go to the dental department. They say, "You do not need that." Let us say it is a Vincent infection. A Vincent infection is trench mouth. You may find the dentist may need some chromic acid for the treatment of the organism, and he may send a requisition through to his medical officer above him, and he says "You do not need that; you may have something else; I will order something else." Now this medical officer knows what is best for medical treatment, and should not the dental officer know what is best to treat trench mouth—because that is his particular job? And when you give him something else, you substitute, and many times material is substituted by those who do not know as much about it as those who are doing the work.

The CHAIRMAN. Then your point is you want to have absolute authority to purchase and acquire that which the dental profession thinks is necessary, without going through the Bureau of Medicine and Surgery?

Dr. MEAD. No.

The CHAIRMAN. If that same thing is followed through, then you would have no military organization, which always has to function through a head.

Dr. MEAD. Oh, yes. You misunderstood me.

The CHAIRMAN. The same thing would apply to ship construction; the same thing would apply with everything else for their specialized needs, would it not? They would say, "Why should I go through the regular channels; why should not I be permitted to go and buy this, that and the other, irrespective of anybody else?"

Dr. MEAD. You have the reason for that. I cited the instance of Bethesda. What is wrong with the set-up at Bethesda? There is nothing wrong with it. You have a dental department separate from the Medical Department, which functions well.

The CHAIRMAN. What about ships?

Dr. MEAD. The same thing.

The CHAIRMAN. They have the skipper on the ship, who is responsible for his ship.

Dr. MEAD. That is right.

The CHAIRMAN. And he has responsibility for everybody on the ship.

Dr. MEAD. That is right.

The CHAIRMAN. And you would have a dental officer who might say, "I do not think I need this stuff" and the skipper says, "I think you do," so that the skipper may make the dental officer get that, or apply for that, because he would be the one to determine what was needed.

Dr. MEAD. That is not correct.

Mr. RIVERS. It is exactly 100 per cent wrong.

Dr. MEAD. All we have asked for is a direct approach to the commanding officer. The commanding officer on board the ship is the captain. If you make a separate dental department, the dentist is responsible to the captain.

The CHAIRMAN. He is responsible to him only in command, but not in getting materials.

Dr. MEAD. Anything that the captain says—if he wants to put the dentist in a dressing station—he does so.

The CHAIRMAN. Now you got down to the point where the trouble was—you wanted authority to get what you needed.

Dr. MEAD. That is right.

The CHAIRMAN. The same thing applies with the ship. The dental officer on the

ship might conclude he did not have and wanted certain things, and the skipper might have a different viewpoint and would have to yield, and he would be in charge of the ship and the health of the men, and yet would have no control over what the dentists would require.

Dr. MEAD. Oh, yes; he would, absolutely. It is the same position as the supply officer. What does the supply officer do on board ship——

Mr. MOTT. Let me ask you a question there: You described the set-up at Bethesda and said that was the kind of set-up you wanted.

Dr. MEAD. That is right.

Mr. MOTT. That you would like to have at every place, under this bill, if this bill passed.

Dr. MEAD. That is right.

Mr. MOTT. Now why did they put this separate Dental Corps at Bethesda and no place else?

Dr. MEAD. I can only hazard a guess, but they needed to come to Congress for something and it sounds more reasonable if they have an admiral for the Center with a three-way command rather than a two-way command—in dentistry, medicine, and hospital corps. Possibly you know something about that.

Mr. MOTT. At Bethesda, who set up this separate Dental Corps?

Dr. MEAD. The Medical Department set it up.

Mr. MOTT. And the Dental Corps functions better at Bethesda than it does at other places, because they are a separate unit?

Dr. MEAD. That is right.

Mr. MOTT. Does a dental officer in the Navy have any immediate commanding officer in the Dental Corps, or is every dentist's immediate commanding officer a doctor?

Dr. MEAD. Always, except at Bethesda.

Mr. MOTT. Except at Bethesda?

Dr. MEAD. That is right.

Mr. MOTT. Then if the dentist in charge of the dental facility in a hospital needs supplies, he cannot put in his requisition for those dental supplies through any dental channel?

Dr. MEAD. Yes; he can put the request in——

Mr. MOTT. Through the dental channel?

Dr. MEAD. No; he puts it in through the Medical Department, through the medical officer over him.

Mr. MOTT. And if that medical officer says he does not need it?

Dr. MEAD. Then he does not get it.

The CHAIRMAN. Is not the same thing true of every phase of the Navy?

Dr. MEAD. No, sir.

The CHAIRMAN. It is true of the Bureau of Yards and Docks. If the commander on the Pacific coast in a certain naval district wants certain things, he has certain people over him to pass on what he wants.

Mr. HÉBERT. That is the same way with Admiral Moreell. Does he have to go to Admiral McIntire and ask permission to build a ship?

Mr. MOTT. But the person in the Bureau of Yards and Docks, his immediate commanding officer, is in the Bureau of Yards and Docks; but I imagine that the dentist, from what you say, is the only branch in the naval service which has an officer as commanding officer who is outside of his own profession?

Dr. MEAD. That is right.

Mr. MOTT. Has there been any complaint on the part of the Bureau of Medicine and Surgery as to the dental set-up at Bethesda?

Dr. MEAD. I have never heard of any.

Mr. MOTT. Have they ever said it did not work properly?

Dr. MEAD. I have never heard of it.

Mr. MOTT. And, in your opinion, it does work better than the dental set-up in any other place?

Dr. MEAD. We think it is the best plan.

The CHAIRMAN. Does not the same principle you are advocating here apply to the Nurse Corps? Why should it not apply to every one of the separate corps now under the Medical Corps?

Dr. MEAD. I do not know anything about the others; I only know about dentistry.

The CHAIRMAN. Well, if your contention is sound, why should it not apply to each one of the four units of the Bureau of Medicine and Surgery?

Dr. MEAD. I do not know anything about the other branches, as to where theirs is different.

Mr. MORRISON. Doctor, what your profession wishes is that you be permitted to practice, as far as it is practical, your profession in the Navy just as you do in private life?

Dr. MEAD. Yes, sir.

Mr. MORRISON. And you are asking no special privilege about that; you are not trying to put yourselves over the medical profession at all?

Dr. MEAD. No, sir.

Mr. MORRISON. Now is there any state in the Union where they have a joint board to license doctors and dentists?

Dr. MEAD. There is not, sir.

Mr. MORRISON. They practice their professions separately in all of the states?

Dr. MEAD. Absolutely.

Mr. MORRISON. And you simply want to go as far in that direction in the Navy as you can practically?

Dr. MEAD. We want that in the Navy.

Mr. MORRISON. And without disrupting the organization of the Navy?

Dr. MEAD. Yes, sir.

Mr. MORRISON. And you do not think this bill would interfere in any hurtful way with the organization of the Navy.

Dr. MEAD. No, sir.

Mr. VINCENT. Doctor, let us get down to a specific case: Suppose you have a battleship or a cruiser, and the dentist on it wants to order a drill, or a filling, or some material

to use in his practice: You have no objection at all to going to the officer in command of the ship?

Dr. MEAD. No, sir.

Mr. VINCENT. But you do not want to have to go to the medical officer and ask him to give that permission?

Dr. MEAD. That is right.

Mr. VINCENT. Now suppose the ship comes into port and some of your officers want to go ashore: Do not they have to go to the medical officer to get leave?

Dr. MEAD. It is the only corps in the Navy that has to go to another corps.

Mr. VINCENT. You cannot go to your own man, but have to go to another profession and get permission?

Dr. MEAD. The dentist has to get permission of the medical officer and the commanding officer, too; has to go through both avenues before he can get leave. And it is the only corps that has to go to another corps.

Mr. VINCENT. The statement has been made here that this would be a duplication: Would this cost the Government any more; would your bill make it any more expensive to the Government than the way it is now?

Dr. MEAD: How could it; because the fact is you would have increased efficiency? And if you have increased efficiency, you are certainly going to have economies enter into that.

Mr. VINCENT. Would it cause any more officers to be appointed?

Dr. MEAD. None. There would be only one chance for more officers. The bill calls for a rear admiral. At the present time, there are two rear admirals in the Dental Corps. Both of those men served in the last war and were decorated for bravery in service outside of their profession. Either one could have been retired and, in fact, one was retired and was recalled and made an admiral, and the other was appointed a rear admiral before he was retired. So there are two admirals under the Surgeon General now, and they would not have need to appoint somebody else.

Mr. VINCENT. So there would be no increase in personnel?

Dr. MEAD. Not unless the Surgeon General wanted them.

Mr. HARRIS. Doctor, some emphasis has been placed here on the point you are just seeking more authority. As I understand the situation, particularly after your explanation of the bill, that is not the whole question here at all.

Dr. MEAD. No, sir.

Mr. HARRIS. In the first place, you would still be under the Bureau of Medicine and Surgery, under the jurisdiction, authority and control of the Surgeon General?

Dr. MEAD. Yes, sir.

Mr. HARRIS. And this proposed Dental Corps, as a separate department, could not make any move or take any action except with the approval of the Surgeon General?

Dr. MEAD. That is correct.

Mr. HARRIS So that all they are concerned with would only be authority resting in the director of the Dental Corps to direct the men and women working within the Dental Corps, and always subject to the jurisdiction and supervision of the Surgeon General?

Dr. MEAD. That is right. It is the approach.

Mr. HARRIS. Now is not there a little question of prestige in this thing? The Dental Corps has risen to the heights of a great profession in this country and I think is deserving of the recognition they have gotten in civil life. You have 70,000 dentists and there are 5,000 in the Navy, and they now are relegated to practically a subordinate position in their present status.

Dr. MEAD. And are very humiliated.

Mr. HARRIS. And part of their desire is to get relief from their present subordinate position, and to give them a rank which will obtain for them the proper prestige and standing in their profession; is that right?

Dr. MEAD. Not so much rank, as authority.

Mr. HARRIS. I do not mean rank of the indiyidual officer, but I mean the standing of the corps as a whole?

Dr. MEAD. That is right.

Mr. HARRIS. Now, when you referred to their efficiency, which you said was not at its full height, you did not mean any individual dentist was not doing the best of which he was capable, but you meant, as a result of the condition in which they find themselves operating, they are not enabled to render the best service of which they are capable if they were given the proper machinery and equipment with which to do it?

Dr. MEAD. That is right.

Mr. HARRIS. And if they were given that, then your contention is they would be in a position to render much better and more efficient service?

Dr. MEAD. Yes, sir.

Mr. HARRIS. Who makes up the efficiency records of the men in the Dental Corps?

Dr. MEAD. The Dental Corps makes them up, but it does not know what happens to them. They are turned in to the medical officer above, and he may change them or not change them, according to his own whim. And we do not know what happens to them.

Mr. HARRIS. In other words, the record of the dental service in the Navy is not determined practically by the head of the dental service who is in a position technically to know whether it is good, bad, or indifferent; but, in the final analysis, is determined by somebody outside of the Dental Corps?

Dr. MEAD. Practically, it is not determined by the Dental Corps at all.

Mr. HARRIS. What about the question of promotions? Does the head of the Dental Corps, who knows whether the dentists are efficient and are eligible, determine whether they shall go up, or does somebody else?

Dr. MEAD. The matter of promotions works very satisfactorily in the Dental Corps

by permission of the Surgeon General. But it is by permission of the Surgeon General; there is nothing in the record or the regulations for promotions in the dental department as there is in the Army regulations. If the Navy is satisfied with the dental service, then there ought to be some regulations; but the things that are being done in regard to promotions are satisfactory.

Mr. HARRIS. Under your proposed bill, efficiency records and merit records, so far as promotions are concerned, will be matters for determination by the head of the dental department, who ought to be capable of determining those matters?

Dr. MEAD. That is right.

Mr. IZAC. Doctor, in the field of discipline, would it not be better to have the head of the dental service at any station, or on any ship, direct the activities of the junior dental officers under him, rather than to have them subject to the discipline, perhaps, of a junior medical officer over them?

Dr. MEAD. Yes, sir.

Mr. IZAC. I think that, to my mind, at least, is the crux of this whole thing—that you have here a corps that should not be beholden to another corps of the Navy. And I can visualize many instances, where the station is rather large, that dental officers in junior grades might be assigned leave by the senior dental officer, and interference would come from the medical officer in saying, "I do not think you had better go ashore today; we need you to stand watch over this matter, or in this connection." Has that been brought up by the dental officers at all; do they lose any discipline?

Dr. MEAD. They would lose the discipline not only of the dental officers, but the dental technicians. The dental men have no control over their own technicians.

Mr. IZAC. As well as the commissioned officers.

Dr. MEAD. That is right.

Mr. IZAC. It would apply right down the line, to all the people who assist in dentistry?

Dr. MEAD. Yes, sir.

Mr. DREWRY. Doctor, you have now a Dental Corps?

Dr. MEAD. Yes, sir.

Mr. DREWRY. And that functions under the Surgeon General?

Dr. MEAD. That is right, sir.

Mr. DREWRY. Of the Medical Corps?

Dr. MEAD. Of the Bureau of Medicine and Surgery.

Mr. DREWRY. And now you want to establish a dental department. What distinction do you make between the two words dental "corps" and dental "department"?

Dr. MEAD. The Dental Corps is now under the medical department, and we have enumerated all those reasons. If you establish what we want, you would have a medical department, and would have a dental department, with equal rights, with direct approach to the Surgeon General, and the dental department would not have to go through medical lines in order to go to the commanding officer to the Surgeon General. They will have access direct to the commanding officer of the ship, hospital, or station—direct to that commanding officer, whether he be a medical officer, a captain, line officer, supply officer, or engineer. They want a direct approach to the commanding officer of the installation and from there on to the Surgeon General; but they do not have that now.

Mr. DREWRY. That is what I am trying to find out. I thought after reading the bill I had it fairly clear, but I am a little confused from your statement. The Dental Corps now functions under the Surgeon General?

Dr. MEAD. Yes, sir.

Mr. DREWRY. And your bill provides that you would establish a dental department which shall function under the Surgeon General as now provided? I am reading from the bill.

Dr. MEAD. That is right.

Mr. DREWRY. So that, regardless of whether you have a Dental Corps or dental department, it is all under the Surgeon General of the Navy?

Dr. MEAD. He has the same authority that he has now; but, from there on down to the installations is where the change is taking place.

Mr. DREWRY. That brings us back to the Surgeon General who is head of all of it, under the bill, as I understand it; that brings us back to the question of the authority in specific instances: Suppose you had a captain in medicine at a station and a lieutenant in the Dental Corps, who would have the final say as to getting supplies or anything else?

Dr. MEAD. Let me take a specific instance, for instance at Bethesda——

Mr. DREWRY. I mean, suppose the bill passes and you have at a shore station a lieutenant in dentistry, the Dental Corps, and a captain in the Medical Corps, would the lieutenant have the final say or would you have to come to the captain in medicine?

Dr. MEAD. Let me give you an exact illustration: You have at the Medical Center in Bethesda, where you have the Medical Department and the Dental Department, you may have a captain in the Medical Department, and if you had a lieutenant in the Dental Department he should be head of the Dental Department when he orders supplies; the Medical Department would have no jurisdiction and the Dental Department would not have to go through the Medical Department of that center; the orders for supplies would go to the commanding officer through the dental officer instead of having to go through a medical officer. And, why should it go through the Medical Corps? Why should a medical officer have anything to do with dental supplies?

Mr. DREWRY. What are we going to do about military authority, respect for the one with the higher rank?

Dr. MEAD. Respect to authority; we have told you that we would go direct from this to the commanding officer, the commanding officer of that station, the same as the military does for supplies in the Supply Corps. There is no difference between what the Supply Corps does and what we are asking for under this change; you have supplies and accounts which is a distinct unit; you have your supplies and your commissary department which are separate and distinct departments, and yet those departments come to the same commanding officer, they have to go to the same place, to the Bureau of Supplies and Accounts; and there is no difference in their set-up and what we are asking.

Mr. RIVERS. But the Medical Department now has charge of installations.

Mr. DREWRY. Let me go back to my previous question in connection with your reference to Bethesda, which is working out satisfactorily under the present law, but let us take the case I had in mind: Suppose there is an isolated station and you have a lieutenant in the Dental Corps, would his orders supersede the orders of a captain in the Medical Corps?

Dr. MEAD. It supersedes them to the commanding officer only.

Mr. DREWRY. Let us say you have two officers and the captain is commander at this station.

Dr. MEAD. Then the captain has control, if he is the commanding officer, and all we are asking is that the dental officer at that station be authorized to directly approach the commanding officer instead of going through the medical officer.

Mr. DREWRY. You would have to change the whole set-up?

Dr. MEAD. You change it only to the extent that you go direct to the commanding officer.

Mr. RIVERS. Let me interpose a question right there.

Mr. DREWRY. In just a moment. Suppose there are two captains, one in medicine and one in dentistry, which one has control at an isolated station?

Dr. MEAD. The one that has control is the commanding officer, and that commanding officer has to be a line officer, in most times, at any event he is going to be commanding officer on the ship, station, or hospital.

Mr. MAGNUSON. Mr. Drewry is asking you about the present system.

Dr. MEAD. In the present system the medical officer has control, absolutely, all the way up to the commanding officer.

Mr. DREWRY. Is that not true under the language of the bill?

Mr. RIVERS. It simply puts it under the commanding officer at the station, instead of the ranking man, who may be in the Medical Corps.

Dr. MEAD. That is right.

Mr. RIVERS. That is all this does.

Dr. MEAD. Right.

The CHAIRMAN. Mr. Mott.

Mr. MOTT. Although you have two admirals, high ranking officers in the Dental Corps, as a matter of fact does the Dental Corps have any real head?

Dr. MEAD. No; it does not have.

Mr. MOTT. They are out most of the time as inspectors of dental facilities.

Dr. MEAD. That is right, and only get over a certain amount of territory.

Mr. MOTT. But the admiral in the Dental Corps really comes under the Medical Corps.

Dr. MEAD. And he has nothing to do with it.

Mr. MAGNUSON. Mr. Chairman, I was going to say——

The CHAIRMAN. What is your question?

Mr. MAGNUSON. With the chairman's permission, I think there is an inference also in the statement that this would not cost the Navy any more. I think possibly if you will check up on that you will find if you separate the two corps in the Navy it is going to cost more. For instance, aboard ship if you separate the Dental and the Medical Corps they are not going to have the same storeroom; they will have separate storerooms, separate stocks of supplies, although perhaps what you mean is that it is not going to call for any more officers, but I think you would find it would cost something more.

Dr. MEAD. You would not have any more officers, and you have your supplies now just the same.

Mr. MAGNUSON. But the minute you separate the dentists aboard ship they are going to move to another part of the ship and they are going to have their own stockrooms and are going to have their own quarters.

Dr. MEAD. That would be up to the captain of the ship.

Mr. MAGNUSON. They are going to have their own system, their own technicians, their own pharmacist's mates, and it is going to cost more if you separate them.

Mr. RIVERS. Mr. Chairman, may I interpose by saying that whatever expense is attached to this bill, if it becomes law, it will have to be approved and passed on by the Surgeon General.

Dr. MEAD. Yes.

Mr. RIVERS. And all the authority emanating to your Department must be approved by the Surgeon General.

Dr. MEAD. Yes.

Mr. RIVERS. And all the authority which you get under this bill and all your procurements will be made with the consent of the Surgeon General, but he will not have to go through a medical officer direct, who knows nothing about your requirements, and why should they be approved by him?

Mr. IZAC. Is it not also true that the technicians aboard ship or at the station are going to be just about under the same set-up?

Mr. RIVERS. Yes.

The CHAIRMAN. To sum it up, the main objective or purpose of this bill is to get the

Dental Corps from under the Medical Corps.

Mr. RIVERS. Yes.

Dr. MEAD. Partial autonomy, and when you get the separate corps, of course, we still would have to contact the Surgeon General, but not through the Medical Corps. We are asking for partial autonomy.

The CHAIRMAN. And when you get this, your next move will be to get from under the Surgeon General? Is that correct?

Dr. MEAD. Mr. Chairman, I will tell you that I will not myself.

The CHAIRMAN. I understand.

Dr. MEAD. And I think that I know the members of the American Dental Association, and if that occurs it will be the fault of the Medical Department, for lack of cooperation.

The CHAIRMAN. What disturbs me, if it is so sound as to be necessary for you to be under the final control of the medical profession, at the top, why is it not just equally as sound to be under control all down the line?

Dr. MEAD. But why should the Dental Corps have to go through the Medical Corps for its supplies instead of going direct to the commanding officer?

The CHAIRMAN. Of course you must bear this in mind, that this is a military organization and if it is sound to have it under a medical head why is it not sound all down the line? That is the thing that is hard for me to understand.

Dr. MEAD. I might answer it in this way, with reference to supplies: There are three divisions in the Supply Corps—it has three divisions; and it is the same principle, and why should the Supply Corps have three different departments? They all go back to the central department and we are not asking anything more, the principle is the same.

Mr. HÉBERT. Mr. Chairman, I would like to ask Dr. Mead a question: Doctor, suppose you had on a ship or at a station a dental officer who happened to be a commander, and in charge of the Medical Division you had a lieutenant commander; who would have authority?

Dr. MEAD. The lieutenant commander, at the present time.

Mr. HÉBERT. The lieutenant commander would have authority over the commander?

Dr. MEAD. At the present time; yes.

Mr. RIVERS. I want to ask you one more question: Have you written any books on this subject of dentistry?

Dr. MEAD. I have written books on dentistry, but not on this subject.

Mr. RIVERS. You have written books on dentistry?

Dr. MEAD. Yes.

Mr. RIVERS. That are used generally by the profession and in the schools?

Dr. MEAD. Yes.

Mr. RIVERS. Into how many languages has it been translated?

Dr. MEAD. Two.

Mr. SASSCER. Doctor, with reference to the statement concerning circularizing Members of Congress, I want to say that you are not branching out into a new field in that respect.

The CHAIRMAN. Oh, no. Thank you, Doctor.

Dr. MEAD. Thank you, Mr. Chairman.

STATEMENT OF DR. WILLIAM A. GARRETT, REPRESENTING LEGISLATIVE COMMITTEE, AMERICAN DENTAL ASSOCIATION

THE CHAIRMAN. Members of the committee, with your indulgence, as I have been honored by having the president of the Georgia Dental Association brought here to convince the committee as well as myself of the wisdom of this legislation, I would like to have the privilege of asking him to testify now. Dr. Garrett, will you come around? We are glad to have a distinguished member of the profession from Georgia to give us his views on this subject. Will you give the reporter your name for the record?

Dr. GARRETT. William A. Garrett.

The CHAIRMAN. Have you any comments to make, or any statement concerning the wisdom and justification of taking the dental officers in the Navy away from the medical officers and giving them carte blanche to channel direct to the Surgeon General?

Dr. GARRETT. Mr. Chairman, I feel that, as the spokesman or representative of the legislative committee, it would be to the best interest, insofar as efficiency in operation is concerned, to make this change.

The CHAIRMAN. How does the present organization impede efficiency? Does it embarrass a dentist to have to go to a doctor to get supplies?

Dr. GARRETT. Mr. Chairman, in instances of installation on ships, mentioned many times, where there is not sufficient provision made, or has not been made in installation, to provide sufficient equipment, it is felt that has resulted principally because the medical men are not familiar with what should be included as a part of the equipment.

The CHAIRMAN. I was also somewhat disturbed during Dr. Mead's statement that they do not have authority to provide proper facilities, and for that reason, if the dentists had a free hand to do what they think necessary, they would have provided proper facilities. That is a rather serious accusation to be made against the Bureau of Medicine and Surgery, and I think it is one that should be clarified, because that amounts to saying that the dentists have failed to get cooperation from the Bureau of Medicine and Surgery, and if they are made responsible for the whole thing do you think they can get more cooperation?

Dr. GARRETT. Mr. Chairman, I think in most instances it has resulted through lack of understanding of the particular program. Dentists are dealing with different problems and in most instances it is simply through lack of understanding; there is no willful lack of co-

operation but probably a lack of understanding on the part of medical officers.

The CHAIRMAN. We all have the highest respect for the dentists, but at the same time I think it is a rather broad statement to make that you have not received proper cooperation from the Bureau of Medicine and Surgery; that is a rather serious accusation and I think it is encumbent upon you gentlemen to show wherein you have failed to get that cooperation and how by setting you up as a separate department you are going to improve the situation.

Dr. GARRETT. Because we understand the requirements of the profession much more fully than a medical man can understand them; we are more familiar with the problems.

The CHAIRMAN. Is there anything else you want to add, Doctor?

Dr. GARRETT. No.

The CHAIRMAN. Thank you.

Dr. GARRETT. Thank you.

STATEMENT OF CAPT. C. RAYMOND WELLS, DENTAL CORPS, UNITED STATES NAVAL RESERVE, PRESIDENT, AMERICAN DENTAL ASSOCIATION

The CHAIRMAN. Members of the committee, I would like to call next the president of the American Dental Association. Doctor, will you come around and give your full name for the record.

Captain WELLS. C. Raymond Wells, Washington, D. C., captain, Dental Corps, United States Naval Reserve, and president of the American Dental Association.

The CHAIRMAN. Captain, the committee will be glad to have you give your views in regard to this legislation.

Captain WELLS. Mr. Chairman, I am only the president of the American Dental Association. I have no verbal or written statement to make at this time as an officer of the Navy.

The CHAIRMAN. Well, we are going to ask you as an officer of the Navy to speak frankly, freely, and candidly and to give the committee the benefit of your views, both as a civilian and in your capacity as an officer in the Medical Corps of the Navy.

Captain WELLS. Mr. Chairman, I would like to preface my statement by saying I am here with the permission of the Secretary of the Navy in my capacity as president of the American Dental Association and not in my capacity as a dental officer.

The CHAIRMAN. All right; but we will ask you to speak also in your capacity as a dental officer because we have a perfect right to do that.

Captain WELLS. I see.

The CHAIRMAN. As a naval officer, we have a perfect right to ask you whatever questions we desire to, and we want you to feel perfectly free to speak to the committee in your capacity, not only as president of the American Dental Association but also as a captain in the Dental Corps.

Captain WELLS. Aye, aye, sir.

Mr. RIVERS. And he can have the assurance that there will be no reprisal.

The CHAIRMAN. Of course, there will not be as to any officer who testifies before a congressional committee when the congressional committee requests it.

Captain WELLS. Are there any questions?

The CHAIRMAN. We want to get your views now in reference to the weaknesses of the present situation, the present organization. What are the weaknesses?

Captain WELLS. Mr. Chairman, I would concur with the presentation of Dr. Sterling V. Mead, as representing the opinion of the dental officers of the United States Navy.

The CHAIRMAN. Wherein lie the weaknesses of the present set-up with the Dental Corps as it is operating today?

Captain WELLS. You have a Dental Corps created by law.

The CHAIRMAN. That is right.

Captain WELLS. Serving as a part of the Medical Department of the Navy.

The CHAIRMAN. That is true.

Captain WELLS. There is no dental department of the Navy as such; a dental officer is not called upon by regulations to assume the duties of a medical officer, except as may be extended in additions or supplements to regulations in time of war.

The dental officer is ordered to a ship, station, or hospital and reports to the commanding officer. He further reports to the medical officer for duty assignment; his orders are endorsed by the medical officer; he receives his assignment, irrespective of his rank, from the medical officer of the ship, station or hospital, as a part of the Medical Department of which the Dental Corps is the component part; he is assigned to the dental office of the medical installation concerned. As such he is under the supervision of the medical officer, irrespective of rank. Irrespective of the rank of the dental officer or the medical officer, if he desires to obtain leave, or submit a requisition or anything of that nature, reports his daily, weekly, or monthly activities and the annual reports the dental officer must go through the medical officer before such can be forwarded to the commanding officer and the bureau concerned.

The CHAIRMAN. Then to sum it up, the conclusion can be drawn that there is some resentment on the part of your profession having to be subordinated to another great profession.

Captain WELLS. Aye, aye, sir.

The CHAIRMAN. You think that your knowledge and your care of the health of the personnel is of such a high character it should be on an equal footing?

Captain WELLS. Aye, aye, sir.

The CHAIRMAN. And, therefore, under the present set-up you are not on the same plane, the same footing, but you are subordinated to the medical profession.

Captain WELLS. Yes; the medical profession is in charge of the dental department.

The CHAIRMAN. What you are requesting in this bill is equal recognition to your profession that has been accorded to the medical profession.

Captain WELLS. The dental profession desires a dental department under the Surgeon General as there is now a medical department under the Surgeon General, and the dentists do not wish to be a part of the medical department.

The CHAIRMAN. Nevertheless, it is a part of the medical profession.

Captain WELLS. No; I beg to differ with you; the dentists are not part of the medical profession.

The CHAIRMAN. They are not?

Captain WELLS. No.

The CHAIRMAN. Do they not have to take the same basic course?

Captain WELLS. They take the same basic sciences but are not part of the medical practicing profession; we are a separate, distinct profession, known in science as the art and science of dentistry.

The CHAIRMAN. And it has no relationship in its preparation to the medical profession?

Captain WELLS. It has similar basic science training, yes, but it develops into a separate and distinct profession.

The CHAIRMAN. To follow that point out about the profession, you mean you specialize in a different field?

Captain WELLS. We have an entirely different field.

The CHAIRMAN. Yes.

Captain WELLS. You have the two degrees; in the first place, if I were a roentgenologist, a neurologist, or an otolaryngologist, I would have a medical degree, irrespective of the specialty and would come under the medical department. The dental officer, however, has a D.D.S. degree—doctor of dental surgery—which is not a medical degree and he is not a member of the American Medical Association, nor does he take the same examination to qualify for a commission in the Navy. The different degree separates him entirely from progress in the medical department.

The CHAIRMAN. And this bill would give him the same equality, the same standing as is given to the medical profession.

Captain WELLS. Well, it would give him exactly the same standing in the Navy as he now has in civilian life, with one exception, and the dental profession by and large believes that it would be just as well to remain under the Surgeon General in the Bureau of Medicine, but not under the medical officer in the field or on the ship or in a hospital.

The CHAIRMAN. In other words, your contention is you want to run the Dental Corps separately from any medical officer in the field or to channel through the medical officer to the commanding officer up to the Surgeon General.

Captain WELLS. Yes.

The CHAIRMAN. As I said to Dr. Garrett, if that is a sound contention to be under the medical head the thing that disturbs me is why is it not equally as sound to channel all the way through down in the field?

Captain WELLS. In the Bureau of Medicine and Surgery you have the Surgeon General who is the commanding officer and we look upon him as the commanding officer of the Bureau; that is a separate command. A dental department, if it is established, would be very happy to have the privilege of serving under the Surgeon General in the Bureau of Medicine and Surgery. However, it is at the ship or station or hospital where this dental officer has as his superior officer, a medical officer, irrespective of rank and his requests must be channeled to the executive officer, representing the commanding officer through the medical officer, and therefore they do not enjoy the same privileges of direct approach as does the medical officer on board ship or at a station.

The CHAIRMAN. In other words, I gather from your statement that the dental officers resent and do not want any medical officers in the field giving them orders.

Captain WELLS. As a military organization in the field, yes; unless so directed by the commanding officer at the ship, station, or hospital.

The CHAIRMAN. At the present time does a dental officer with the rank of commander resent a medical officer of equal rank giving him orders, telling him what he is going to do?

Captain WELLS. No; that has no bearing on the purpose of the bill.

The CHAIRMAN. That has a lot of bearing, does it not?

Captain WELLS. It is not a question of rank in considering two different departments.

The CHAIRMAN. But that is the whole question, is it not?

Captain WELLS. The question is that the Dental Department wishes to be in the same category as the Civil Engineer Department, Supplies and Accounts; on an equal footing with the other staff corps, with the same privileges as the Medical Department.

The CHAIRMAN. Well, you say the Engineer Corps. There are members of the Engineer Corps that have to take orders from line officers, of course.

Captain WELLS. So would the dental officers.

The CHAIRMAN. And they resent that?

Mr. RIVERS. No; they do not.

Captain WELLS. No.

Mr. RIVERS. They do not resent it; they simply want a separate department.

CAPTAIN WELLS. The engineers may have a separate department, they go to their executive or commanding officer of the station, who is a line officer; there may be a medical officer or a supply officer in command, depending upon the nature of the command.

The CHAIRMAN. Is not all of this agitation for a separate department contrary to the old theory that is now running through

the minds of Congress, and running through the minds of the department, that is, consolidation and not breaking off?

Captain WELLS. That is not our desire. I am not familiar with that.

The CAPTAIN. Thank you very much. Any questions of the Captain?

Mr. SASSCER. I am not quite clear, Captain, as to just how it works out in the Army. The Army has a separate corps?

Captain WELLS. I am not too familiar with the Army set-up, but I can give you such information as I have.

Mr. SASSCER. I understand they have a separate dental corps in the army.

Captain WELLS. That is correct. In the Army you have a dental corps which is headed by a major general in the office of the Surgeon General of the Army, and as such he has direct access to the Surgeon General; he is in charge of the Army Dental Corps.

In the Navy you have a chief of the dental division in the Bureau of Medicine and Surgery, and that would be the exception that I would point to. So, I would say that the Army has a Dental Corps headed by an officer in the office of the Surgeon General, with direct access to the Surgeon General, with no other specialty of any kind over him.

Mr. SASSCER. Has not the Congress recently provided for a Pharmacist Corps in the Army?

Captain WELLS. Yes; I believe it did; but I am not sure whether the bill was passed or not; but I know there was agitation for it.

Mr. HARRIS. It passed the House.

Captain WELLS. I am not very familiar with it.

Mr. DREWRY. Would you have any objection to changing the word "department" in the first paragraph of the bill to "corps," establish a Dental "Corps?"

Captain WELLS. Sir, we have a Dental Corps by law; by act of Congress the corps is already in existence, but the Dental Corps is a part of the Medical Department of the Navy, and what this bill, as I understand, provides, is that the Dental Corps shall be under the Dental Department.

The CHAIRMAN. To sum it up, Captain, what you accomplish by this legislation is the dental officers are given their freedom from the medical officers except you remain under the Surgeon General's office.

Captain WELLS. I think the dental officers would be delighted to serve under the Surgeon General.

The CHAIRMAN. That is what you accomplish; every one of the 5,000 dental officers in the Dental Corps of the Navy could now say to the medical officers, "We are running our own establishment; we do not have to take orders from you, because we are running our own establishment." Is that not it?

Captain WELLS. We would not put it that way. We would say to the medical officer that we can go direct to the commanding officer as you have been privileged to do as a medical officer.

The CHAIRMAN. But you make the complaint and you show that you now have to channel all your requests through somebody who does not belong to your profession.

Captain WELLS. That is, we have to channel the requests through the Medical Department.

The CHAIRMAN. And they do not belong to your profession?

Captain WELLS. That is right.

The CHAIRMAN. And you want to channel your requests through members of your own profession.

Captain WELLS. Yes; to channel the requests through the commanding officer of the ship, station, or hospital.

The CHAIRMAN. In other words, you do not want to have the doctors telling the dentists they cannot have this or that or the other thing that you think you are qualified to pass on.

Captain WELLS. Aye, aye, sir.

The CHAIRMAN. That is the effect of it.

Mr. MAAS. Doctor, who makes up the budget; who approves the budget of the Dental Corps at the stations?

Captain WELLS. It is approved by the Medical Department of the station, ship, or hospital, and finally is approved by the commanding officer.

Mr. MAAS. And allotments for the Medical Department include allotments for the Dental Corps?

Captain WELLS. Yes.

Mr. MAAS. And at the stations and ships a medical officer is in charge.

Captain WELLS. Yes; the officer in control of Dental Corps allotments.

Mr. SASSCER. Doctor, in private life before you entered the Dental Corps, where did you practice?

Captain WELLS. I practiced as an officer in the Regular Navy for six years. I resigned to engage in practice in Brooklyn, N. Y., where I practiced until May 20, 1941, when I was recalled to active duty as a Naval Reserve officer.

The CHAIRMAN. Any further questions?

Mr. RIVERS. I have one question, Mr. Chairman.

Captain, this bill has the unanimous approval of the American Dental Association and some of the members want complete divorcement from the Surgeon General with which you are not in accord?

Captain WELLS. Aye, aye, sir.

Mr. RIVERS. That is, the part which would divorce the Dental Department from the Surgeon General and you feel the passage of this legislation would promote efficiency and the service of the organization will be improved greatly?

Captain WELLS. Yes.

The CHAIRMAN. But it is your opinion that you should remain under this Surgeon General?

Captain WELLS. We are honored and privileged to serve under the Surgeon General.

The CHAIRMAN. Thank you very much, Captain.

Mr. COLE. Mr. Chairman, I want to ask Captain Wells if this bill as reported has the approval of the National Dental Association and all its members; have all the members of the association seen this bill?

Captain WELLS. Let me give you a little background; I think it was perhaps five years ago that the resolution was first issued by a state society, and it finally came through and has been on the table of the same dental association for some time. There have been successive resolutions entered from other state societies and it came to the point where the association had to take some action due to pressure from other state societies, and it was finally presented by the board of trustees to the house of delegates of the association, and then the delegates authorized the association to direct that a bill be drawn, and that was done.

Mr. COLE. Do you know who drafted this bill?

Captain WELLS. No; except that I know it was presented by Dr. Mead and his legislative committee, who I assume had full charge of the bill.

Mr. COLE. If the bill is approved by the members of this committee with the thought of accomplishing what you want to be accomplished, I just hope they are better dentists than they are bill writers, because the bill, to my mind, is absolutely innocuous.

Mr. RIVERS. Perhaps it can be perfected.

Captain WELLS. We are dentists.

The CHAIRMAN. I think all the dentists in my district judging from the letters and telegrams I have received, are quite familiar with the bill, and I imagine that is true of nearly every other member's district throughout the country.

Mr. COLE. They are familiar with the objectives of the bill, but not familiar with this bill.

The CHAIRMAN. Thank you very much, Captain.

Captain WELLS. Thank you.

STATEMENT OF PAUL M. CONAWAY, OF MACON, GA.

The CHAIRMAN. Members of the committee, I would like to, with your indulgence, introduce Mr. Conaway, the attorney for the dental association for the State of Georgia. This is the first time I have been honored to have a constituent appear before the committee.

I have received a telegram, I think, from most of the dentists in the state, and I would like them to go in the record, except I do not wish them printed at Government expense, and I also want to put my answer in.

Mr. Conaway, you are lawyer for the Georgia Dental Association?

Mr. CONAWAY. The correct title is director of public relations, Mr. Chairman.

The CHAIRMAN. Public relations?

Mr. CONAWAY. That is right.

The CHAIRMAN. You have gotten out of the field as legal adviser to the dental association and are known as public-relations adviser. Most of the representatives from the labor associations and other organized bodies are a little bit different. They are all lawyers for them, but when we get to the dental association we have no lawyer, but a public-relations adviser, and that is your arrangement with the association?

Mr. CONAWAY. Yes.

The CHAIRMAN. Did you draft this bill?

Mr. CONAWAY. I did not. I want to explain, Mr. Chairman, that I am here more as a spectator rather than as a witness. I am just here from Macon, and I would like to tell the committee that of course the Georgia Dental Association and the Sixth District also have unanimously endorsed this legislation.

The CHAIRMAN. I know they have. Every dentist in my district has sent me a telegram and I commend Dr. Mead for being so aggressive.

Mr. CONAWAY. Mr. Chairman, I do not think I can discuss the technical applications of the bill.

The CHAIRMAN. Do we have anybody here from the Minnesota Dental Association?

Mr. MAAS. I represent the Minnesota association.

The CHAIRMAN. We will put in the record a resolution by the Minnesota State Medical Association.

Mr. MAAS. I want to point out, Mr. Chairman, that the medical profession throughout Minnesota, the medical association as well as the dental association, have endorsed the bill.

(The resolution referred to follows.)

RESOLUTION BY THE MINNESOTA STATE MEDICAL ASSOCIATION WITH REFERENCE TO THE ESTABLISHMENT OF A SEPARATE DENTAL DEPARTMENT IN THE NAVY

Whereas there has been introduced in the House of Representatives by Congressman Rivers a bill known as H. R. 4216 to provide more efficient dental care for the personnel of the United States Navy through the establishment of a Dental Department which shall function under the Surgeon General of the Navy, and said bill has been referred to the House Naval Affairs Committee; and

Whereas H. R. 4216 has the endorsement of the Minnesota State Dental Association and the American Dental Association: Now, therefore, be it

Resolved, That the Minnesota State Medical Association, in regular session assembled, endorses the principle of the establishment of a Dental Department in the Navy, which shall function under the Surgeon General, the functions of said Dental Department to be of such "professional, technical, and administrative nature as pertain to the conduct of the naval dental service, including cooperation with the Medical Department in all matters of mutual interest and cognizance," as provided for in said H. R. 4216 and for

the provision of such dental personnel as is proper under the circumstances; and be it further

Resolved, That a copy of this resolution be forwarded to the Honorable Melvin J. Maas, St. Paul, Minn., ranking minority member of the House Naval Affairs Committee, to the other Members of the Congress from Minnesota; to the Surgeon General of the United States Navy; and to the council on medical services and public relations of the American Medical Association.

STATEMENT OF DR. J. BEN ROBINSON, PRESIDENT, MARYLAND DENTAL ASSOCIATION

The CHAIRMAN. Our next witness is Dr. Robinson, of the Maryland Dental Association.

Dr. Robinson, you are president of the Maryland Dental Association.

Dr. ROBINSON. At the present time, I am head of the dental school of Maryland University, and I am vice chairman of the American Dental Association.

The CHAIRMAN. What have you to say to us about the bill?

Dr. ROBINSON. I would like to emphasize, if I may, Mr. Chairman, the point that has been made by the preceding witnesses, and to call attention additionally to the professional difference between the medical and dental profession.

I shall not take up too much of your time. I should like to say that a dentist is a specialist in the field of health service; it is not a specialty in conventional medicine where you think of dentists in terms of having any relationship, from the standpoint of a specialty in the field of medicine. The dentist has long sought closer cooperation and closer relationship to the medical profession, but at no point in private practice or in public relationship does he come into the medical profession as such. From the beginning of his practice he is in a different organization, nationally, state and locally, and from all points his practice is distinct and separate from the medical profession. His professional requirements are the same—the professional requirements are not in the same line all the way through, but they are equivalent to medicine.

For the first two years of training they are very much the same.

The statement made to you by the Department contains suggestions that to my way of thinking are misleading. For instance, reference is made to the fact that dentists should have training in physiology and pathology. Those two subjects are named and I think it is only fair for you to know that dentistry measures up to medicine in its teachings in its professional courses in those respects.

At the end of the second year of medicine and at the end of the second year of dentistry the courses begin to diverge in all the institutions of teaching in the United States, and there is no relationship between them in the curricula or in the teaching.

For example, the school which I represent, the University of Maryland, has a school of dentistry and we have a school of medicine, each directly responsible to the administrative officials of that university. The school of dentistry pays no obeisance to the school of medicine; it conducts its own program of instruction and training and the men go out from the institution ready to serve in the general field of health service.

I make the statements because I feel that it should be clearly understood that there is a differentiation in private practice because it has its counterpart in the bill in the differentiation in the Navy.

The only three places which dentists may subordinate—I might say are subservient to the medical profession, and that is in the United States Army, in the Dental Corps of the Bureau of Medicine and Surgery, and in the United States Public Health Service. We have sought diligently to reestablish some conditions which have for their purpose greater efficiency under a type of self-determination, and which is bound to come under the circumstances.

I should like to make a point now with regard to the origin of this movement. Captain Wells has given you some idea of it. I preceded Dr. Wells, now Captain Wells, as president of the American Dental Association.

The urge for this movement comes from men in the Navy, dental officers in the United States Navy all over this world. I have scores and scores of letters requesting me, as president of the American Dental Association last year, to increase the activities of the American Dental Association in achieving the passage of this bill to effect complete separation. That demand was so great that under my presidency last year I urged the house of delegates to give no thought to complete separation because I believe that the American Dental Association could work out the problem within the Bureau of Medicine and Surgery of the Navy.

I am heartily in favor of this bill and I want to say to you that the American Dental Association has been charged with playing politics, and I am frank to say to you that we do. I imagine that is not foreign to the members of this committee.

The CHAIRMAN. Not to this committee.

Dr. ROBINSON. Except to this committee.

The CHAIRMAN. It is not foreign to this committee.

Mr. SASSCER. And I imagine it is not foreign to the American Dental Association.

Dr. ROBINSON. I think you will find it in all organizations.

At any rate, the thought is to achieve these purposes in the interest of the common good, and that is all we want.

Now, I think that a line of commissions can be established between the Dental Corps and the Medical Corps in the Navy, Bureau of Medicine and Surgery, without injury to medicine and with tremendous good to dentistry.

I am not privileged, Mr. Chairman, to mention names here, but I have seen instances and I have had many communications concerning installations where changes have been made in the commanding medical officers, where they have said they wished to do certain things which would be beneficial where some of the medical men took a position opposite, where suggestions have been completely nullified. They say they are unable to make any progress because of lack of sympathetic understanding and lack of understanding as to the needs.

Now if it were necessary that that should be done, perhaps we could get along in the same manner as we have carried along, but it is not necessary.

The question was raised with regard to the situation in the Dental Corps of the United States Army. I have had some experience with that institution. As president of the American Dental Association a condition was found that required investigation and I was one of those chosen to conduct the investigations. We found that the difficulty that the Dental Corps of the United States Army was encountering lay in the fact that the medical officer was in charge of supplies and where the needs of dentistry was as much as nine months behind, and the needs for the other nine units in the various divisions was no more than thirty days behind. Dentistry had been disregarded in the stress under which they were working and found itself in the position where it was unable to meet the duty which was imposed upon it. That must be borne in mind when you are considering the technical operation of the duties.

We are asking for the authority, we want the authority, not because of any vanity on the part of the dental profession, but because we believe it is necessary in the winning of this war. We believe that it will be helpful to the services that are being rendered to the young men now in the Navy.

We are acting here for the people who are back of us when I say to you that many of the people wanted complete separation.

The CHAIRMAN. There is no question of promotion involved in this?

Dr. ROBINSON. I beg your pardon.

The CHAIRMAN. There is no question of promotion involved in the proposed legislation?

Dr. ROBINSON. I do not think promotion is the primary purpose of it at all.

The CHAIRMAN. The control of promotions is still vested in the Department?

Dr. ROBINSON. Mr. Chairman, I would have to admit a lack of knowledge on the mechanics of the Department.

The CHAIRMAN. You are advocating it because in your opinion it would improve the morale of 5,000 officers in the service.

Dr. ROBINSON. I think it will help morale and I think it will improve the service.

The CHAIRMAN. Thank you very much. Any questions?

Mr. MAAS. What advantage would result in having a separate corps, separate dental corps, under the Bureau of Medicine and Surgery? Why would it not be a better set-up to have a Dental Corps of the Navy? What is the advantage of remaining under the Surgeon General?

Mr. ROBINSON. Dentistry has always sought a closer cooperation with medicine because they are both interested in health service and both are interested in the individual. We do not want to be separated from the medical organization or from its administration because we believe it will bring us greater efficiency. What we are after is to get the type of separation that will make it possible for the Dental Corps to operate under conditions of autonomy, that will allow them to maintain their standards of practice in the Navy or in the Army, as they do in private practice.

Mr. MAAS. Is it your conception that at a naval station or on a naval vessel the senior dental officer would be the commanding officer of the dental department on that ship?

Dr. ROBINSON. I would imagine that he would because of his familiarity with the needs, and I would say "Yes," that the authority should be vested in the commanding dental officer for the things pertaining to dentistry.

Mr. MAAS. You made a general statement, and a very good one, but we are dealing with special legislation and we want to know the mechanics of the proposed set-up. Is the thing that you are driving at to have the dental officer, the senior dental officer, at a station or aboard ship become his own commanding officer of his own unit, or just what type of recognition are you seeking to secure by having a separate dental department as distinguished from the Medical Corps?

Dr. ROBINSON. The impression—and I admit some familiarity with that organization—is that we do want authority over the financial department, authority over supplies, particularly of supplies, because that has caused a great deal of trouble in having to pass through the hands of the medical officers. The medical officer is thinking in terms of medical needs and not always in terms of dental needs; and please bear in mind, insofar as I am able to learn from studies I have made, there is no medical school in the United States that teaches dentistry and no dental school that teaches medicine—no medical student comes out with any knowledge of dentistry.

There is a lack of knowledge, a lack of sympathetic understanding, a lack of appreciation which is important to dentistry; therefore the man who must be placed in charge of dentistry needs to know what is required; and I would say that the dental profession, that it should be provided that the Dental Corps should have that responsibility.

Mr. MAAS. I am not going to oppose this bill, but I am impressed with the thought that a complete separation deserves consider-

ation, but I am going to support the bill as it is drawn.

The CHAIRMAN. Thank you very much, Doctor.

Mr. SASSCER. Dr. Robinson, the great University of Maryland, of which we are all so proud, does not require that the dental students go through the medical school, or have any contact with it at all?

Dr. ROBINSON. We are on the same footing in the University of Maryland as the school of medicine.

Mr. SASSCER. That is true. What do you think would be the result if the requests for supplies and procurement of services had to go through the medical department of the school?

Dr. ROBINSON. Well, I do not think it would last very long.

Mr. MOTT. Doctor, you said you had talked to a great many dental officers about this proposed legislation and had received letters from many of them.

Dr. ROBINSON. Yes.

Mr. MOTT. Have you talked to any dental officers or received any letters from any dental officers who are opposed to the legislation?

Dr. ROBINSON. No.

Mr. MOTT. Do you know of any who are?

Dr. ROBINSON. I do not.

Mr. HARRIS. Doctor, there are certain instances in which patients are wounded in action where both a doctor and a dentist have to administer to them.

Dr. ROBINSON. Yes.

Mr. HARRIS. Would this proposed set-up in any degree facilitate against the necessary sympathetic cooperation between the physician and the dentist in such a case where the patient needed the services of both?

Dr. ROBINSON. I think it would improve it.

The CHAIRMAN. If you have unity of command who would be in charge?

Dr. ROBINSON. I think there would be no difficulty there. Of course, the dental officer would naturally defer to the medical officer on matters pertaining to medical needs, just as I think the medical officer would be glad to defer to the dental officer in fields in which his knowledge is valuable, just the same as they do in private life where you find cooperation between the medical and the dental profession.

Mr. HARRIS. I see no reason why there should be any clash of authority which would militate against the service.

Dr. ROBINSON. I practiced dentistry for twenty-six years and I cooperated closely with the surgeons and physicians in my city and I cannot visualize any difficulty that would be encountered in the naval service.

The CHAIRMAN. Mr. Mott.

Mr. MOTT. Doctor, I would like to get your comments on one paragraph on page 2 of the report which appears in this language:

> It has been the policy of the Navy Department to add to the professional qualifications of dental officers by giving them postgraduate instruction in plastic surgery of the face, advanced instruction in pathology, and postgraduate study in all forms of anesthesia and advanced first-aid. This has contributed to the usefulness of dental officers in battle organization.

Dr. ROBINSON. Yes.

Mr. MOTT. Would the enactment of this bill interfere in any way with the program mentioned in the second paragraph on page 2 of the report of the Secretary of the Navy.

Dr. ROBINSON. The language of that statement suggests to me the intimation that it provides something that the dentists have not had before. That is not true. The dentist has that as a part of his undergraduate course.

Mr. MOTT. Plastic surgery?

Dr. ROBINSON. He has it in his demonstration work and in his training and plastic surgery for dentists is as advanced in that line as it is in the medical line, so far as training goes.

Mr. MOTT. I understand it is.

Now the statement says—

> by giving them postgraduate instruction in plastic surgery of the face and advanced instruction in pathology.

Dr. ROBINSON. Yes.

Mr. MOTT. And this would contribute to the usefulness of the dental officers in battle organization.

Dr. ROBINSON. Yes.

Mr. MOTT. Now what I am asking is whether the enactment of this bill would interfere with the program mentioned in this statement.

Dr. ROBINSON. No; it could not interfere with it at all. I do not see how there could be any possible interference with it. It might on the other hand, improve it, and with these proceedings, I believe it is the policy of the Navy with respect to the dental and medical officers, to give them advanced training.

In dental practice and medical practice, the purpose is to help the wounded and injured, and manifestly there are certain phases of it where the dentist can render greater sevice.

Mr. MOTT. You think the change proposed here would not interfere with that?

Dr. ROBINSON. No.

The CHAIRMAN. Thank you very much, Doctor.

Dr. ROBINSON. Thank you.

(To be continued in May issue)

THE JOURNAL *of the* AMERICAN DENTAL ASSOCIATION

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FEDERAL FUNDS FOR DENTAL HEALTH EDUCATION AND CARE

In 1939, the House of Delegates of the American Dental Association approved a three-point program through which dentistry could participate in a broadened national health program. This program was based on (1) intensified dental research to secure more information regarding the causes of dental disease, thus making preventive measures more effective and eventually decreasing the amount of dental disease; (2) a national program of dental health education to motivate people to utilize present methods of prevention and control of dental disease, and (3) programs for dental service, particularly for children, since prevention and control measures are most effective in this age group.

After a lapse of six years, this program has been translated into legislation, which is now pending before Congress. On January 10, Sen. James E. Murray, Montana, introduced a bill authorizing the appropriation of $1,730,000 for intensified dental research.* On February 16, Rep. Philip Traynor, Delaware, introduced a bill to provide $7,000,000 for dental health education and care.† Both of these bills will have the active support of the American Dental Association.

The bill for dental health education and care is based on the principle of providing funds through federal grants to the states in accordance with the individual needs of the states. Under such a system, a large measure of control over the design and

*See J.A.D.A., 32:231, February 1, 1945.
†See J.A.D.A., 32:383, March 15, 1945.

content of the program is retained at the state and local levels, a principle to which the American Dental Association has been committed for many years. A system of federal grants to the states for health purposes was also given approval by the Pepper Committee of the Senate recently in its recent report on wartime health and education.‡

If the dental health education and dental care bill is passed by Congress, one of the greatest handicaps to more effective dental programs—the lack of funds—will be partially overcome. Out of expanded programs operating in state and communities under widely differing conditions will eventually come the experience and knowledge that will be influential in preparing larger plans, to meet more and more of the dental needs of the country.

The passage of these two bills will mark an important point in the effort to improve the dental health of all of the people; but legislation alone will not be effective in achieving the greater goals that must be reached. Legislation must be supplemented by vigorous, enterprising effort on the part of all who bear the responsibility for dental health. The role of the dentist and of the dental society is clear.

The dental resources of each community must be appraised by a scientific survey of personnel and facilities.

Dentists and dental societies must participate in a nationwide program to disseminate knowledge of public health dentistry and methods.

Each state and community should establish its own council on dental health, which shall have as members representatives of all groups that are interested in dental health.

The dental division of the state health departments should be strengthened so that it will have the funds, personnel, authority and program to work actively toward improved dental health.

When the two federal bills are passed, dentists and dental societies should insist that their own states make use of available funds, particularly for dental health education and dental care for children.

Experimental programs should be designed and initiated at once to meet the specific needs of the state and community.

Through this combined process of legislation and constructive effort on the part of all dentists and dental societies, a realistic approach will be made to this complex problem. It will also aid in forestalling undesirable legislation and programs, and, more important, it will finally bring to accomplishment an authentic national program for improved dental health.

DENTAL PICTORIAL

The first issue of *Dental Pictorial,* a dental magazine for the laity that was to have been published March 1 by the American Dental Association, has been postponed owing to the critical wartime shortage of paper. This will be a matter of disappointment and regret to the Bureau of Public Relations, which sponsored the enterprise, and to the hundreds of dentists and dental societies that had taken part in the preliminary planning. It is to be hoped that, when wartime restrictions have been lifted, this project of supplying dental health education to the public can again be initiated to meet a great national need.

‡J.A.D.A., 32:270, March 1, 1945.

THE ARMY DENTAL CORPS

The months that followed the declaration of war by this country immediately focussed attention on certain lacks and deficiencies in the regulations governing dental officers and the Army Dental Corps. Not long after, as the Army Dental Corps began its unprecedented task of preparing millions of men for combat, these lacks were recognized by many dental societies, dental officers and civilian dentists. Vigorous protests on the part of the American Dental Association and other organizations were met with bland assurances that (1) conditions had been overstated; (2) no official evidence was at hand to prove the case, and (3), even if there was, nothing could be done about it as long as the war continued.

It is good, even at this late date, to see that this basic problem has finally been recognized by those who are in the best position to do something about it. In a statement published elsewhere in this issue, Maj. Gen. Robert H. Mills, Chief of the Dental Division, announces that Army regulations are being revised to "erase" the primary objections now raised by many with reference to the Medical Department."

These "primary objections," which have been heard for more than three years now, are too well known to every dental officer to need much rehearsal here. They include the unfavorable status occupied by officers of the Dental Corps with respect to the officers of the Medical Corps; the difficulty of dental officers in securing promotion earned by merit and justified by function; the assignment of responsibility without a compatible assignment of authority; the illogical procedures that allow purely dental problems to come under the survey, revision and veto of medical officers; the unjustifiable interference of one corps in the professional affairs of another; the discrimination in regard to rank.

These difficulties are subject to two remedies: (1) the revision of departmental regulations and (2) legislation. The first would bring about relief by granting to the Dental Corps the rights and functions that have been arbitrarily withheld by regulations of the Medical Department. The second would compel such relief at the direction of Congress and might result in the separation of the Dental Corps from the Medical Department. There is still some valid debate as to which of these actions will produce a more efficient dental service for Army personnel.

In his statement, General Mills strongly favors the revision of departmental regulations rather than legislation because, he says, "legislation which would force an autonomy for the Dental Corps at this time would result in a false gain." Without entering into a discussion of that viewpoint, it can now be said, at least, that the attitude of General Mills and of the Medical Department is clear.

Many will wonder, of course. Why are problems formerly ignored now admitted to amount to a "controversy of major proportions"? Why were three years and more allowed to elapse before it was discovered that only departmental regulations, and not legislative acts, created and perpetuated these inequalities? Why, if a revision of regulations is to be preferred to legislation, was this not accomplished long before this time since nothing more than willingness and initiative were needed to solve the problem?

The answers to those questons will be interesting, but not decisive. If General Mills now feels that he can correct all inequalities in the Dental Corps, he should be given an opportunity to demonstrate this belief. Legislation should be held briefly in abeyance until it can be determined whether the changes will be mere tokens to dissatisfaction or an actual solution of the problem.

This promise of revision must not be used to delay for too long a time those basic changes that are so urgently needed. The Dental Division should press for an immediate and effective revision so that relief can be secured while thousands of dental officers are still in the service of their country. If this revision succeeds in bringing about fundamental corrections, the dental profession will welcome this very great contribution to the efficiency of the Army Dental Corps. If not, the American Dental Association, in accordance with the instructions of its House of Delegates, will vigorously urge legislation to bring about the desired changes without further delay.

FELLOWSHIP IN DENTAL AND ORAL PATHOLOGY

In keeping with the policy that led to the establishment of fellowships at the National Bureau of Standards and at the National Institute of Health, the American Dental Association has recently established a new fellowship in dental and oral pathology with the American Registry of Pathology at the Army Institute of Pathology, Army Medical Museum, in Washington, D. C. These fellowships are supported financially by funds from the Association and are designed to provide a continuing program of research into specialized dental fields.

The new fellowship, which is open to graduates of recognized dental schools and which pays an annual stipend of $2,000, will afford advanced training in dental and oral pathology. It will provide an unusual opportunity for any dentist who wishes to prepare himself for a career in dental education or research. In this way, the fellowship will serve as a training ground, that highly trained men may be available to serve the profession as teachers and educators.

ASSOCIATION ACTIVITIES

MAJOR GENERAL MILLS PREFERS CHANGES IN REGULATIONS TO LEGISLATION TO CORRECT INEQUALITIES IN DENTAL CORPS

Legislation to improve the status of the Army Dental Corps is "not essential or even desirable," according to a statement issued by Maj. Gen. Robert H. Mills, Chief of the Dental Division, "provided significant changes can be made with the existing laws through a modification of the present accepted Army regulations."

General Mills, who issued his statement February 15, to "assist in clearing the position the Dental Division has taken toward the question of autonomy for the Army Dental Corps," also indicated that a revision of Army regulations governing the Dental Corps was now under way.

The text of General Mills' statement follows:

A controversy of major importance has arisen in certain circles of the American Dental Association, pertaining to the present and future status of the Army Dental Corps. There are those who believe that all problems can be solved, and that all personnel associated with the Corps will attain undisputed equitable consideration, in accordance with the desires of dentistry, through the medium of federal legislation. Then there are those who desire, through legislative channels, to divorce themselves from the Medical Department.

It is my opinion that legislation is not essential or even desirable, provided significant changes can be made with the existing laws through a modification of the present accepted Army Regulations. General Kirk, the Surgeon General, has given the Dental Division a free hand in the direction of its policies and personnel. Every cooperation and assistance has been afforded the dental staff in the Surgeon General's Office, and if a comparable relationship could be obtained throughout all the channels of command, the primary objections now raised by many with reference to the Medical Department would be erased. General Kirk is fully cognizant of the administrative problems in some of the lower echelons of command, and accordingly plans for a change in Army Regulations are now under way. It is believed that the proposed change in Army Regulation, if approved, will accomplish more over a period of time than if forceful legislative methods are employed. Since Dentistry is a profession with its primary objective directed to the preservation of health, and since Dentistry must work with Medicine for the best interests of the war effort, legislation which would force an autonomy for the Dental Corps at this time would result in a false gain.

It is my hope that those in the profession who are committed to the belief that legislation is the only solution to the future welfare of the Corps will first evaluate the results obtainable through a change in Army Regulations before the enactment of laws is attempted.

The above letter is submitted to you for publication in THE JOURNAL. It is believed these comments will assist in clearing the position the Dental Division has taken toward the question of autonomy for the Army Dental Corps.

McDOWELL CONFIRMED AS BRIGADIER GENERAL

The Senate confirmed the nomination of Col. Rex McK. McDowell as brigadier general February 12. General McDowell is the third dental officer to reach this rank. He is on duty at the Office of the Surgeon General, Washington, D. C.

The Medical Department now has more than forty general officers on the active list. Two of these officers are members of the Dental Corps.

DENTAL EDUCATION

ELLENDER INTRODUCES BILL TO PROVIDE MORE DENTAL STUDENTS FOR ESSENTIAL NEEDS BY MILITARY RELEASES AND DEFERMENTS

A bill "to authorize the release of persons from active military service and the deferment of persons from military service, in order to aid in making possible the education and training of physicians and dentists to meet essential needs" was introduced into the Senate by Sen. Allen J. Ellender, Louisiana, February 26. The bill has been referred to the Committee on Military Affairs.

In introducing the bill, Senator Ellender said:

Because of the discontinuance of the Army Specialized Training Program and the Navy V-12 programs for the training of medical, dental, premedical and predental students, Congress is confronted with a most pressing problem. Except for a few students to be enrolled in the freshman classes of 1945 in the medical and the dental schools, these training programs have ceased to admit any new students. Therefore, the Congress must provide a method of enabling young men to be trained for the practice of medicine and dentistry. This is a manpower problem of the present moment only, because a critical shortage of doctors and dentists after 1948 must be anticipated and can only be prevented by action taken now, before September 1945. . . .

There are over 21,000 dentists in the Army and Navy today. Both services are adequately manned in their respective Dental Corps. There is no reason to expect that any more dentists need be drafted or that any more than those military training program students now enrolled in dental schools will be required for military duty.

There are about 52,000 practicing dentists in civilian life today. Approximately 2,000 are lost annually by death or retirement. There is little prospect that the number can be materially increased during the next five years except by dental school graduations.

It is estimated that no more than 500 dental students can be procured for the 1945 admitting class, from IV-F's, veterans and women. As I previously indicated, 2,400 were enrolled this year. This means that at least 1,500 more must be procured from other sources. It is therefore provided that 1,750 students may be annually deferred; and this group shall be selected from not more than 3,500 who may be deferred for the predental training.

PROVISIONS.—The bill (S. 637) makes the following provisions relative to dental and predental students:

1. The President is authorized to release from active duty in the armed forces men who have completed more than one year of honorable service during this war and who have satisfactorily completed a substantial portion of their dental or predental training. This release is conditioned upon the student's acceptance by an accredited school.

2. The President is authorized to defer training and service under the Selective Service Act for those men who are enrolled in the dental and medical educational programs, subject to the following restrictions:

(a) The number of men deferred for the first year of predental education shall not exceed 3,500 at any one time.

(b) The number of men enrolled in the program for the purpose of permitting them to pursue second-year predental education and training shall not exceed three thousand five hundred at any one time prior to the end of the third month of the academic year and shall not exceed one thousand seven hundred and fifty at any one time after the end of the third month of the academic year, and after the end of such third month shall not include any one who has not been accepted for admission to the earliest subsequent entering class of an accredited dental school following the satisfactory completion of such second

year predental education and training.

(c) No man will be enrolled in the program to permit him to pursue predental education for more than two years.

(d) The number of men permitted for the four years of dental education shall not exceed 1,750 in each class at any one time.

(e) The limitation on the number of men enrolled in the program will not be a limitation on the total number of students who may be enrolled in dental and predental schools.

(f) The number of men deferred for two years of predental education will be allocated by the President to the states on the basis of the 1940 census.

(g) Representatives of accredited schools shall be consulted and their services may be utilized in selecting the students.

(h) No man who fails to make satisfactory progress in his education and training will be permitted to continue in the program.

NAVY RULES ON COMMISSIONS FOR YOUNG V-12 GRADUATES

The commissioning of dental and medical students who are under 21 years of age at the time of their graduation from professional school under the Naval V-12 program was the subject of a recent release* by the Bureau of Naval Personnel.

The text of the release follows:

As a result of the accelerated academic programs for medical and dental students in the Navy V-12 Program, it is anticipated that a limited number of such men will complete the requirements for graduation from medical or dental schools prior to their having attained the age of 21. As the laws of practically all the states require that applicants for license to practice medicine and dentistry be 21 years of age, it is considered highly desirable that such a requirement be maintained by the Medical Department of the Navy.

Therefore, in the event that a medical or dental student in the Navy V-12 Program completes his professional academic training before he attains the age of 21, he will be commissioned as Ensign H(P) (probationary) on graduation and will be assigned to active duty under the cognizance of the Bureau of Medicine and Surgery or, at his request, he may be released from active duty status until he has reached the age of 21. The services of such Ensigns H(P) assigned to active duty in the Navy will be utilized in laboratory work or in other duties not involving actual medical or dental treatment until they become 21 years of age, at which time they will be eligible for appointment as Lieutenants (jg) (MC), U. S. Naval Reserve, or Lieutenants (jg) (DC), U. S. Naval Reserve, and assignment to intern training or to general duty.

At the time recommendations for appointment to commissioned status on completion of requirements for graduation from medical or dental schools are forwarded in conformance with the requirements of reference (a), the commanding officer should recommend any man who will not have reached his twenty-first birthday for appointment as Ensign H(P) rather than Lieutenant (jg) (MC) or (DC) and, if the student wishes to exercise the privilege of requesting inactive duty, such written request will be forwarded by the commanding officer to this bureau via the Bureau of Medicine and Surgery.

*Navy V-12 Bull. No. 273.

EAST AND CRAWFORD NEW DEANS AT COLUMBIA AND MINNESOTA

Bion R. East has been named associate dean of the School of Dental and Oral Surgery, Columbia University, and William H. Crawford has been appointed as dean of the School of Dentistry, University of Minnesota.

Dr. East, who is assistant professor of public health practice at Columbia, succeeds Houghton Holliday. He is a graduate of the School of Dentistry, University of Michigan, 1908. Dr. Crawford, after serving six years as dean of the School of Dentistry, Indiana University, returns to the University of Minnesota, from which he was graduated in 1923. He succeeds William F. Lasby, who has reached retirement age.

PRESIDENT'S MESSAGE

PRESIDENT SCHERER URGES DENTAL SOCIETIES TO ESTABLISH PROGRAMS FOR VOCATIONAL GUIDANCE

Dentistry, as a health service profession, stands at the threshold of its greatest achievement. Throughout its history, the profession has never lost sight of its responsibilities to the people whom it serves. By every professional means available, the aims and objectives of the services of the profession have been called to the attention of lay educators through educational channels by the American Dental Association. Through dental health education, the public has been awakened to the need for better mouth health. In a short space of time, dentistry has arisen to heights in the field of mouth health treatment far beyond that it had been expected to attain in the beginning. The need for dental health service by the people probably has not increased since the establishment of the first school of dentistry in the United States. Rather, we have come to recognize the values of the service that is rendered by dentists. Recognition of the service rendered by dentists is widespread. Now we hear proposals for a dental health service that is all inclusive.

It is important that the profession recognize the significance of these proposals. The question arises as to how we can provide a sufficient number of dentists to direct the programs that are proposed and to render the service that will be necessary. Before dentists began enlisting in the armed forces, it was recognized that it would be necessary to increase the enrollment in the dental schools in the United States, so that an increased number of properly educated dentists could be graduated to meet the need for better dental health service.

SHORTAGE.—It is recognized that an alarming shortage of dentists exists and that this shortage of dentists will increase rather than diminish, since a great number of dentists will elect to remain in service. Too, the dental services that have been rendered to the enlisted man will lead him to seek dental service after he is discharged.

The emphasis that has lately been placed by groups other than the dental profession on the need for dental health services on a broader base has focused the attention of a great number of people on the need for better health service for children and industrial workers.

It is apparent that the enrollment in dental schools must be increased. The possibilities for service in the dental profession are unlimited. Great numbers of young men and women must be made aware of these opportunities. Each year, there are thousands of young men and young women who aspire to a life work that will permit them to serve their fellowman in the field of health service. These young men and young women enter college to prepare for a career in medicine. The majority are not aware of the opportunities for service that are available to them through the medium of dentistry.

ADEQUATE SERVICE.—Proper and adequate dental service for the people of the United States is a responsibility of the dental profession. It is our responsibility to see to it that young men and young women who are interested in a health service profession become acquainted with dentistry as a vocation. If members of the American Dental Association would assume the responsi-

bility for interesting some young man or young woman in the study of dentistry, within a short while the number who would apply for admission to the dental schools would exceed the places that are available. This could result in an improvement in the quality of the candidates who were accepted by the dental schools.

Dentistry as a companion profession to medicine in the health service field offers to young people comparable opportunities. Today, the services of the ophthalmologist as an eye physician, the otologist as an ear physician, the cardiologist as a heart physician, the dentist as a mouth physician and the other specialists in the health service field are accepted by the people as a definite need in their everyday life.

GUIDANCE. — Young people's interest needs to be directed toward dentistry, since they are usually not aware of the close relationship that exists between medicine and dentistry. No one can doubt that the number of dentists that will be needed in the United States will increase with each succeeding year. Since a minimum of six years is required to educate a dentist properly, it is essential that immediate action be taken.

A few states have inaugurated programs to create interest in dentistry as a vocation. A plan of one of these states is of interest. A program of interest to young people (sports, contact with popular celebrities or entertainment) is arranged by the local dental society. The deans of nearby dental schools are invited to attend. Since the meeting is a dinner meeting, the attendance is limited to the guests of the members of the local society. Short talks by the deans and others pertaining to dentistry as a vocation are interspersed with entertainment. This plan is creating considerable interest in the study of dentistry in the young people who attend.

I invite the dentists of the United States to send to the American Dental Association their ideas relative to the manner by which the interest of young men and young women in dentistry may be heightened.—*W. H. Scherer, President.*

BUREAU OF PUBLIC RELATIONS

DENTAL PICTORIAL DELAYED BECAUSE OF WAR PAPER SHORTAGE

The publication of *Dental Pictorial,* scheduled for March 1, has been delayed indefinitely owing to the extreme wartime shortage in paper supplies, Lon W. Morrey, Director, Bureau of Public Relations, announced recently. This wartime shortage, coupled with a new 10 per cent reduction contemplated for the second quarter of this year, makes it inadvisable to launch the new publication at this time, as to do so might jeopardize the paper quota of THE JOURNAL.

Recent reports on the paper problem indicate that "Administrators are convinced that a 10 per cent cut cannot be avoided for the second quarter. There is no evidence of any improvement in the pulp and paper supply situation, and the fact is further aggravated by the request of the Foreign Economic Administration for an allocation of paper to be shipped to the liberated countries." In view of this critical shortage, the Board of Trustees, at its recent meeting decided to postpone the publication of a dental magazine for the laity until there is improvement in the paper situation.

The Bureau of Public Relations and its advisory committee, Dr. Morrey said, wishes to thank the original subscribers for their cooperation and their continued patience in the face of these delays occasioned by the war.

COUNCIL ON DENTAL THERAPEUTICS

COUNCIL DECLARES NOVOCAIN-PONTOCAINE-COBEFRIN NOT ACCEPTABLE FOR ACCEPTED DENTAL REMEDIES

The following report was adopted by the Council on Dental Therapeutics and submitted to the firm for its comments. The firm's reply, under the date of August 11, 1944, presented some preliminary data on Novocain-Pontocaine-Cobefrin from a clinical study stated to be in progress. Because the tentative data were both incomplete and inconclusive, the Council delayed publication of its report until January 25, 1945, pending presentation of the completed study. Since the latter has not been made available to the Council, the report is being published as originally adopted. The Council will continue to evaluate any controlled data that are presented on behalf of this product.—*Donald A. Wallace, Secretary.*

Novocain-Pontocaine-Cobefrin, a local anesthetic mixture intended for injection, is stated to have the following composition:

Novocain, brand of procaine HCl	0.02	Gm. (2%)
Pontocaine, brand of tetracaine (2 dimethyl aminoethyl p-butylamino benzoate) as HCl	0.0015	Gm.
Cobefrin, brand of nordefrin (dihydroxyphenyl propanol-amine) as HCl	0.0001	Gm. (1:10,000)
Acetone sodium bisulfite, not more than	0.002	Gm.
Sodium chloride	0.002	Gm.
Potassium sulfate	0.004	Gm.
Aq. dest. q.s. ad.	1.0	cc.

The product was submitted to the Council for consideration several years ago.[1] At the time, it seemed that, for special cases, wherein a period of anesthesia longer than usual was desired, the product might have value, although it appeared to be needlessly complex. The data which were available then indicated that it was about as potent and toxic as 3 per cent procaine with cobefrin 1:10,000. However, the evidence presented by the firm was inadequate to make it clear whether Novocain-Pontocaine-Cobefrin was superior to or as good as 3 per cent procaine with cobefrin 1:10,000.

During the years that have elapsed since Novocain-Pontocaine-Cobefrin was first placed on the market, it has become apparent that it has actually been used not for special cases only, but also routinely in all types of dental procedure. Since it has been the experience of dentists for many years that a 2 per cent procaine solution is strong enough to have the effects desired in the routine practice of dentistry, and since such products as Novocain-Pontocaine-Cobefrin are more toxic than the 2 per cent procaine solutions that are accepted by the Council, it is evident that the widespread use of Novocain-Pontocaine-Cobefrin constitutes a potential hazard to the public health which the Council should not ignore, in fairness to the dental profession and the public that it serves.

The general availability of such products as Novocain-Pontocaine-Cobefrin in ready-prepared form, coupled with the methods that have been used to bring about their widespread routine use by the dental profession, has resulted in a situation that is contrary to the interest of the public.

The extra strong anesthetic solution

1. Preliminary Report on Novocain-Pontocaine-Cobefrin Solution. J.A.D.A., 29:2247, December 1, 1942.

such as Novocain-Pontocaine-Cobefrin, may appeal to those who are impressed with an apparently desirable and high order of efficiency; but it must never be forgotten that this cannot be attained to the exclusion of other considerations. It is possible that anesthesia is obtained with such a solution with a less accurate injection technic than would be required if one of the accepted 2 per cent procaine solutions were used. However, it would be better for the dentist to make an accurate injection, utilizing less of a 2 per cent procaine solution, than to rely on an extra strong (and more toxic) anesthetic. There is reason to believe that the difference in rate of absorption and destruction of the procaine and pontocaine precludes any uniformity of action of the original ratio of these ingredients, with or without cobefrin. It is believed that the toxicity of this mixture is greater than that of 2 per cent procaine, which would be an indication for providing a greater local vasoconstrictor efficiency; whereas the opposite is implied in the firm's advertisements. However, acceptable clinical evidence of the implied benefits to the exclusion of undesirable features is entirely lacking.

None of the ingredients of Novocain-Pontocaine-Cobefrin is new. They were not new when the product was introduced to the dentist. All of them have been on the market for years. It is possible that the best reason for the introduction of the product is that the firm which introduced it has a monopoly in the dental field on the use of the word pontocaine, which is a synonym for the U.S.P. product tetracaine. Acceptable scientific evidence which was submitted to the Council by the firm on behalf of the product at the time of its introduction certainly would not support any other point of view.

The Council is opposed to the routine use in dentistry of local anesthetic solutions more potent or more toxic than 2 per cent procaine. This opposition is based on the principle that, in the use of drugs, the minimum amount necessary for the desired effect is the maximum amount that should be employed. The Council objects to all ready-prepared commercially available local anesthetic solutions stronger than 2 per cent procaine, because it has been shown by sales records that far more cartridges of such solutions have been used by dentists during the past four years than could be accounted for on the basis of any but routine use.

Recent advertising for Novocain-Pontocaine-Cobefrin attempts to further the widespread use of this product by pointing out that its sales have reached large proportions. The fallacy in such advertising is that widespread use is not an adequate criterion of usefulness or value. There are in widespread use today many other items which are not the best or safest that could be used. Many items that were popular at one time passed out of common use as the profession or the public became better informed.

The Council's Rule No. 10 reads, "No product which is useless or inimical to the best interests of the public or of the dental profession will be accepted or retained. . . ." Novocain-Pontocaine-Cobefrin is marketed in violation of this rule and is therefore not acceptable for A.D.R.

NEW ARTICLES INCLUDED IN ACCEPTED DENTAL REMEDIES

The Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following articles in the list of Accepted Dental Remedies:

ANESTHETICS—LOCAL*

Procaine HCl 2%, Epinephrine 1:25,000: Composition: See Procaine HCl 2%, Epinephrine 1:25,000—S. F. Durst & Co. (J.A.D.A., 31:1125, August 1, 1944.)

Manufactured by S. F. Durst & Co., Phila-

*A.D.R. Ed. 10. p. 39.

delphia, Pa. Distributed by Crescent Dental Manufacturing Co., Chicago, Ill.

Procaine HCl 2%, Epinephrine 1:50,000: Composition: See Procaine HCl 2%, Epinephrine 1:50,000—S. F. Durst & Co. (J.A.D.A., 31:1125, August 1, 1944.)

Manufactured by S. F. Durst & Co., Philadelphia, Pa. Distributed by Crescent Dental Manufacturing Co., Chicago, Ill.

Procaine HCl 2%, Epinephrine 1:25,000: Composition: See Procaine HCl 2%, Epinephrine 1:25,000—S. F. Durst & Co. (J.A.D.A., 31:1125, August 1, 1944.)

Manufactured by S. F. Durst & Co., Philadelphia, Pa. Distributed by The Dentists' Supply House of Arkansas, Little Rock, Ark.

Procaine HCl 2%, Epinephrine 1:50,000: Composition: See Procaine HCl 2%, Epinephrine 1:50,000—S. F. Durst & Co. (J.A.D.A., 31:1125, August 1, 1944.)

Manufactured by S. F. Durst & Co., Philadelphia, Pa. Distributed by The Dentists' Supply House of Arkansas, Little Rock, Ark.

Admission of a product to the list of Accepted Dental Remedies means that the product and the methods by which it was marketed at the time of consideration were not found to be in violation of the Council's published rules. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics. All information is available upon request and inquiries are welcomed. A postal card inquiry will bring a prompt reply.—*Donald A. Wallace, Secretary.*

LANTERN SLIDES AVAILABLE FROM THERAPEUTICS COUNCIL

Standard size lantern slides and explanatory material for use in talks to dental meetings are available to members on request to the Council on Dental Therapeutics. These materials, which are not intended for use in lectures to lay groups, may be obtained without charge by writing to the secretary of the Council, 222 E. Superior St., Chicago 11, Ill.

NOTICE OF JUDGMENT UNDER U. S. FOOD, DRUG AND COSMETIC ACT

The following notice of judgment under the Federal Food, Drug and Cosmetic Act was issued in February 1945.

5778. Adulteration and misbranding of The Stuart Formula Tablets. U. S. v. 420 Bottles of The Stuart Formula Tablets. Decree of condemnation. Product ordered released under bond for relabeling. (F.D.C. No. 9878. Sample No. 30573-F.)

Examination showed that this product contained less than 400 U.S.P. units of vitamin D per 3 tablets.

On May 12, 1943, the United States attorney for the Western District of Washington filed a libel against 420 bottles of The Stuart Formula Tablets at Seattle, Wash., alleging that the article had been shipped in interstate commerce, a portion on or about January 28 and February 18, 1943, from Pasadena, Calif., by The Stuart Co., and the remainder on or about April 16, 1943, from Los Angeles, Calif., by the Metropolitan Warehouse Co.; and charging that it was adulterated and misbranded.

The article was alleged to be adulterated in that a valuable constituent, vitamin D, had been in whole or in part abstracted or omitted therefrom.

It was alleged to be misbranded in that the statements appearing on its label, "Each 3 Tablets Standardized to Contain at least: . . . Vitamin D . . . 800 U.S.P. or INT. Units (activated ergosterol) (2 times minimum need)," were false; and in that the statement, "Human need known—minimum requirements not yet established," appearing on the label, and as applied to vitamin B_6 and calcium pantothenate, was misleading since it engendered in the minds of the readers that it was the consensus of experts in the field of nutrition that these vitamins were necessary in human nutrition, whereas the need for these vitamins in human nutrition is not generally recognized by these experts as being established. It was alleged to be misbranded further in that it purported to be and was represented as a food for special dietary uses by reason in part of its calcium pantothenate and vitamin B_6 content, and its label failed to bear such information concerning its vitamin properties as has been determined to be, and by regulations prescribed as, necessary in order fully to

inform purchasers as to its value for such uses, since its label failed to bear the statement, "The need for calcium pantothenate and vitamin B_6 in human nutrition has not been established," as required by the regulations.

June 1, 1943, the William T. Thompson Co., claimant having admitted the allegations of the libel, judgment of condemnation was entered and the product was ordered released under bond for relabeling in conformance with the law, under the supervision of the Food and Drug Administration.

Issued February 1945.

Council Declares Thrice-A-Week Tooth Cleanser Not Acceptable for Accepted Dental Remedies

The Council on Dental Therapeutics has voted to publish the following report on "Thrice-A-Week" Tooth Cleanser. This report was sent to the firm before publication. The reply of the firm contained no acceptable scientific evidence or references to the scientific literature. —*Donald A. Wallace, Secretary.*

REPORT.—According to the records of the Council office, the manufacturer and distributor of Thrice-A-Week Tooth Cleanser is the Thrice-A-Week Company, 1009 Bank of America Bldg., San Diego, Calif. Harry Prescott Emeis, D.D.S., of the same address, is listed as the owner of the firm.

November 9, 1944, on receipt of an inquiry from the laity, a request for information with regard to Thrice-A-Week Tooth Cleanser was sent to the firm. The firm sent trade packages of the product together with labels and copies of a leaflet used as a package insert. The firm stated:

> The composition of Thrice-A-Week is,
>
> *Powder*
>
> 1 part FFFF Pumice
>
> 3 parts precipitated tri-calcium phosphate
>
> *Liquid*
>
> 1 part water
>
> 3 parts glycerine
>
> 2 oz. ten per cent Mercurochrome to the gallon, flavored with oil of Peppermint and Spearmint.

It is assumed that the powder and liquid are mixed to form the finished product, which is a paste. The product contains about 12 per cent of pumice, according to the statement of the firm.

The product was tested by the A.D.A. Bureau of Chemistry and it was found to scratch glass readily under the conditions outlined in section Fl-d of Federal Specification FFF-D-191a. This was to be expected from the high stated content of pumice. The pH value of the product was found to be 6.7 at 20 C.

The leaflet that accompanies the package contains the following statement:

> Thrice-A-Week Tooth Cleanser removes this film more effectively than any other tooth paste or powder now available and can be used with great advantage three times a week as an adjunct to Twice-A-Day Tooth Paste—or with any other tooth paste or powder you are now using. However, in most mouths, the daily use of Thrice-A-Week night and morning in the place of the powder or tooth paste you are now using, will reduce tooth decay noticeably and harmlessly.

The product appears to be distributed principally in San Diego, Calif., at the present time, but the leaflet contains the following statement, which makes it appear that widespread distribution is contemplated:

> Thrice-A-Week is the formula of a dentist with forty years of dental experience and still in active practice. It can be obtained at present only in San Diego but will be mailed to any address in the United States, postage prepaid, upon receipt of fifty (50c) cents a tube — address — Thrice-A-Week Company, 1009 Bank of America Bldg., San Diego, California.

The distributor of a toothpaste that

contains 12 per cent of pumice is obviously under obligation to provide strong evidence that his product will not cause harm to the dental tissues under actual conditions of use. So far as the Council is aware, such evidence does not exist. Because of its composition, the product must therefore be assumed to be potentially dangerous under probable conditions of use and is therefore not acceptable for inclusion in Accepted Dental Remedies.

PUBLIC HEALTH

STATEMENT ON NATIONAL PROGRAM FOR DENTAL HEALTH ISSUED BY JOINT COMMITTEE OF THREE A.D.A. COMMITTEES

A statement outlining a professional and legislative approach to a national program for dental health has just been issued by a joint committee of the Council on Dental Health, the Committee on Legislation and the Committee on Economics of the American Dental Association. Two bills to translate this program into action have already been introduced in Congress.*

The plan outlined by the joint committee follows the program approved by the House of Delegates in 1939. It proposes to make funds available for dental purposes through federal legislation. Much of this money will be made available to the various states for the establishment of state and local dental programs through a system of grants. The states, in accordance with this plan, will then be enabled to design programs to meet their own needs under certain broad and general conditions.

This program has been published in pamphlet form and is available on request to the American Dental Association, 222 E. Superior St., Chicago 11, Ill.

*S. 190 to authorize the appropriation of $1,730,000 for dental research. See J.A.D.A., 32:231, February 1, 1945.

H. R. 2234 to authorize the appropriation of $7,000,000 for grants to the states to aid programs of dental health education and care. See J.A.D.A., 32:251, March 15, 1945.

The text of the joint statement follows:

Just one hundred years ago, American dentistry had its beginnings as a profession. In that space of five generations, many tasks were accomplished. The customs, habits and traditions of the old craft were abandoned. An autonomous educational system was developed and made strong. The barriers of licensure were erected against the charlatan and the quack. The opposition of individuals and of other professions and groups were neutralized by growing independence and progress. New materials and technics were perfected to improve the quality of dental service. Finally, the inseparable link between the biologic sciences and the new profession was forged by study, research and discovery. Dentistry, in a single century, had come of age as a health service. In that period, it set up a standard of dentistry that is unparalleled today anywhere in the world.

What, then, are the tasks for American Dentistry in the second century? The answer is simple in statement: to furnish the benefits of dentistry to more of the American people until the ideal of providing this health-giving service to all is attained. But the solution will not be so simple in achievement because this is a complex problem, of great magnitude.

If America has available the best dental care in the world, why is it that all of the people do not, or cannot, receive the dental service that they need? The answer to that question can be put into terms which, perhaps, oversimplify the problem.

In the matter of dental health, most people

fail to recognize their obligation to themselves, their family and their community. Many who can afford to pay for dental care have not learned that dental health is so essential that it must be purchased, even if luxuries must be foregone. Many neglect their teeth because of the traditional, but unfounded fear of dental service. Most people who cannot afford to pay for their own dental care do not get it because most communities have failed to recognize their obligation to their citizens. Another important factor in making dental care available to all is the uneven distribution of dentists. Many areas, particularly in rural sections, are inadequately supplied with dental personnel.

RESPONSIBILITY.—The responsibility for providing dental care must be borne in the same manner as the responsibility for providing food, shelter or any other essential of life. It is the American custom and tradition for the individual to attempt to supply these things for himself. If he cannot do so, the responsibility falls on the family, the community, the state and the nation successively. If each assumes an equitable share of responsibility, the problem of better dental health in this country is on the way to solution, but even if every one assumed full responsibility toward dental health, the problem would not be solved completely because three facts, two of which are based on attitudes that are thoroughly grounded in human nature, come into operation.

1. The average person does not realize how closely his dental health is related to his general health and, as a result, he does not seek dental attention until he is compelled to do so by discomfort or pain. Most dental diseases produce their harmful effects slowly and they are not so dramatic as, say, appendicitis. When suddenly stricken with appendicitis, one knows that if he delays in having an operation, he may die. Few people realize that a similar penalty may be attached to the neglect of dental diseases and, as a result, the patient may postpone treatment until great harm is done. If the patient were trained to think of dental disease as having a direct and important influence on general health and, indeed, upon life itself, he would seek treatment on his own initiative before serious consequences occur.

2. Dental operations, in the old days, were rather painful because technics were primitive, and the great discoveries of local and general anesthesia had not been made. This led to a traditional fear of dental operations and, even today, many still gave this fear as a reason for postponing necessary dental treatment. Unreasonable fear combined with the lack of appreciation is a fundamental reason why more American people do not seek dental care even when it is within reach.

3. A third reason, often overstressed, but not to be overlooked, is the actual lack of money to pay for needed dental care. Dental care is one of the least costly of the major health services; yet if dental disease is allowed to persist until great damage is done, the cost of correcting it is higher. All in all, it is not dental care, but dental neglect that is expensive.

In spite of these difficulties, the percentage of people receiving dental care in this country is higher than the percentage of those receiving such care in any other country of the world, even in those lands where it is included in a compulsory insurance system. The American dental profession, realizing what a costly toll dental neglect takes of the national health, has long worked toward extending the benefits of dental service to all of the people.

Some of the reasons that a national dental program cannot be put into effect in a single stroke have already been considered. There are many others. This problem, which has existed for many generations, must be approached from the scientific and realistic viewpoint rather than from the political or the idealistic. The mere desire and the need to do something—even when that something is wholly good—does not always make it immediately practicable.

There are good reasons for believing that these difficulties can be solved by continued careful planning and experiment; that a successful national dental health program can be worked out. Much effort has already been expended in this direction by dentists, dental societies and other interested individuals and groups. This effort has produced, not a formula for a program, but many basic truths out of which the formula will eventually emerge. Let us examine some of these basic truths.

Dental neglect costs more than timely dental treatment.

The control of dental decay by administering timely dental treatment to children as-

sures a definite lowering of serious dental defects in later life.

The cost of providing essential dental service for children is, according to present estimates, less than one half the cost of providing essential dental service for adults.

A dental care program loses much of its value unless it is accompanied by a program of dental health education that motivates the patient to seek regular dental care.

Knowledge of the two main dental diseases —decay of the teeth and disease of their supporting structures—is not yet complete, and preventive measures are not so direct and specific as they will be when full knowledge is available. In order to reap the benefits of more effective prevention, dental research must be continued and intensified.

The addition of sodium fluoride to water supplies may become the first successful public health measure for the control of dental decay on a large scale at a relatively small cost.

Dental service tends to deteriorate when control of the professional service is not left in the hands of dentists.

In countries that have compulsory health insurance, the dental benefits have been rudimentary and primitive. Frequently, they were given in addition to other benefits and the cost of dental appliances was often divided between the patient and the insuring agency.

There is no evidence thus far that the insurance principle can be applied successfully to dentistry, since nearly every one has some need of dental benefits.

Programs for dental care must be divided into two phases: (a) the work that must be done to put the mouth in healthy condition, and (b) the work that must be done periodically to maintain it in a healthy condition.

Not all of these facts have the same weight and not all of them deserve the same consideration in designing a dental health program. They *do* indicate many of the factors in a successful national dental health program.

VIEW OF THE A.D.A.—The American Dental Association, which has as members more than 56,000 of the 70,000 dentists in the United States, has long given serious attention to the improvement of dental health in this country. The Association, long before any other agency, either public or private, recognized, called attention to and tried to correct the inadequacy of existing dental health programs that are inevitably reflected in a lowered standard of national health; but the profession unaided should not be expected to furnish the funds necessary for a program of such huge proportions. Such resources must be furnished jointly by those who bear this responsibility for dental health. Until individuals and responsible agencies assume this burden, already neglected for too many years, there can be no successful national dental health program.

The American Dental Association, recognizing its responsibility to dental health, has utilized professional knowledge and experience to outline a practicable and equitable program under which all responsible agencies can discharge their obligations.

In keeping with the traditions that have made this country great, the program is based on the assumption of responsibility by all concerned; and the greater responsibility is laid upon the American community. In this way, local funds and facilities, under local control, can be made to serve the interest of dental health. For this reason, among others, the American Dental Association has not recognized a national compulsory health insurance system as effective or desirable in providing dental care; i.e., because such a system nullifies local responsibility and local control.

The American Dental Association, in developing its proposal for a national dental health program, has considered all of the scientific facts associated with the control, prevention and treatment of dental disease. It has weighed carefully the needs of the public, the resources of the profession, the practicability of administration, the productive expenditure of funds and the limitations of scientific knowledge and technics.

A.D.A. PROGRAM.—No attempt can be made here to document every detail of the proposal of the American Dental Association for an effective national dental health program. Rather, an attempt will be made to produce a blueprint of only the essential details.

The American Dental Association believes that an effective national program for dental health should include the following fundamental elements:

1. Intensified research to secure more information regarding the causes of dental diseases, thus making preventive measures more effective and eventually decreasing the amount of dental disease.

2. A national program of dental health education to motivate people to utilize present methods of prevention and control of dental diseases.

3. Programs for dental service, particularly for children, since the most effective prevention and control can be accomplished in this age group.

Because these three points are integrally related, no national dental health program should be established without including all of them.

DENTAL RESEARCH.—It is self-evident that the prevention and control of dental diseases depends on an extension of the knowledge of these diseases; yet dental research has been consistently neglected by both public and private agencies. Two bills authorizing the appropriation of federal funds for dental research were introduced into Congress in recent years and both failed to pass.

The American Dental Association has sponsored the introduction into Congress of a third bill authorizing an appropriation of $1,000,000 to construct and equip a national institute for dental research. This bill also authorizes an appropriation of $730,000 for additional facilities to foster dental research by public and private agencies. The enactment of this bill will be a constructive approach by the federal government to the establishment of a sound national dental health program.

DENTAL HEALTH EDUCATION.—The second point of the American Dental Association program includes the establishment of a coordinated program of dental health education at community, state and national levels. This phase of the program is based on the fundamental belief that, in a democracy, people can be educated to raise their standards through their own efforts. Many programs of this type already exist in various states and communities, but most of them have been handicapped by a lack of support from responsible agencies. Sufficient funds from local tax monies should be allocated to public health and educational agencies for this purpose. Community resources, if they prove inadequate, should be augmented by state and, if necessary, federal funds. Dental divisions of health departments should use their facilities to a greater degree in order to become more effective units in dental health education at both state and community levels.

The American Dental Association has sponsored the introduction into Congress of a bill authorizing the appropriation of $7,000,000 for allotment to the states both for dental health education and for dental care.

DENTAL CARE.—The third point of the American Dental Association's program is the provision of dental care. It is accepted that dental health can best be maintained by the early correction of dental defects and, for this reason, the American Dental Association emphasizes dental service programs for children. Such programs, if properly administered and controlled by dentists, would permit the correction of dental defects as they occur, thus preventing an accumulation of dental need.

Funds to provide both dental health education and dental care are authorized in the bill sponsored by the American Dental Association. This bill, when enacted, will allot funds to the state that will enable it to meet its own dental health needs and those of its communities.

These funds should be used to provide a program of dental health education for all and dental health service programs for children and dentally indigent adults in accordance with local needs and resources.

Because of the variance to be found in the American community, the American Dental Association has made no recommendation as to one service plan that would be considered applicable to all communities. Communities may, therefore, supply dental service in the office of private dentists, in hospitals, in schools or in public health dental dispensaries. Rural communities may wish to use mobile clinics.

CONCLUSION.—This program is not revolutionary: it is evolutionary. It makes use of existing mechanisms, strengthening and improving them where there is need. It maintains the integrity of the traditional social unit of American life, the community. It is not prohibitively expensive nor legislatively impracticable. It is based on a knowledge of the scientific aspects of dental diseases. It is an undeniable preliminary to the expansion of a dental health program for all people of the country. It can be put into action when the leadership of American Dentistry is met with equal leadership in government—in the community, in the state and in the nation.

RECOMMENDATIONS ON DENTAL CARE FOR CHILDREN

A conference on dental care for children, called by the Children's Bureau, Department of Labor, was held in Washington, D. C., February 22-23. Fifteen recommendations dealing with dental care for children were adopted by the Conference.

Among those in attendance at the meeting, in addition to Martha Eliot, assistant chief of the Children's Bureau, were:

Bert G. Anderson, associate professor of surgery, Yale Medical School, New Haven, Conn.; Julian D. Boyd, professor of pediatrics, Children's Hospital, State University of Iowa, Iowa City; Harvey J. Burkhart, director, Eastman Dental Clinics, Rochester, N. Y.; M. Don Clawson, director, Dental Health Services, Oak Ridge Dental Health Center, Oak Ridge, Tenn.; Kenneth A. Easlick, associate professor of public health dentistry, University of Michigan School of Public Health, Ann Arbor; John T. Fulton, chief, Division of Dental Hygiene, State Department of Health, Hartford, Conn.; Charles L. Hyser, New York; A. LeRoy Johnson, administrative officer, Harvard School of Dental Medicine, Boston; Leon R. Kramer, director, Division of Dental Hygiene, Kansas State Board of Health, Topeka, Kan.; John Oppie McCall, New York; Howard M. Marjerison, associate director, Forsyth Dental Infirmary, Boston; Lon W. Morrey, director, Bureau of Public Relations, American Dental Association, Chicago; Emory W. Morris, general director, W. K. Kellogg Foundation, Battle Creek, Mich.; Dean Roberts, chief, Bureau of Child Hygiene, State Department of Health, Baltimore; Frederick J. Stare, assistant professor of nutrition, Harvard Medical School, Boston; Harold C. Stuart, Department of Child Hygiene, School of Public Health, Harvard University, Boston; R. M. Walls, Bethlehem, Pa.; William C. Webb, Jr., executive director, Children's Dental Clinics of the Philadelphia Mouth Hygiene Association, Philadelphia; Harold C. Hodge, associate professor, Biochemistry and Pharmacology, School of Medicine and Dentistry, Rochester, N. Y.; George St. J. Perrott, chief, Division of Public Health Methods, U. S. Public Health Service, Washington, and Philip W. Woods, dental officer, Farm Security Administration, U. S. Department of Agriculture, Washington.

RECOMMENDATIONS.—Following is the text of recommendations made by the Conference.

Recognizing the great need for a nationwide program of dental services and education for children, and recognizing the desirability of associating dental service for children with all other health services for children and mothers in order that full benefits of programs for improving nutrition, controlling infections and providing medical and surgical care may accrue to the children receiving the dental health service, and in order that the organization of the maternal and child-health program including the school health service and health education program may be utilized to the fullest extent, it is recommended that:

1. Adequate Federal funds be made available to the Children's Bureau for grants to State health agencies to develop programs of dental services for children, including the training of personnel, dental health education, and demonstrations.

2. Funds be made available to the Children's Bureau for research in problems relating to the dental health of children.

3. Adequate dental care be made available to all children regardless of income or geographic location.

4. Varied and coordinated methods of supplying service, such as through trailers, clinics, school health services and the offices of practicing dentists, be considered in planning a service that is applicable to the local situation.

5. In a public dental care program, provision be made for sufficient professional supervision of service to insure maintenance of standards and quality, such supervision to be developed in accordance with the method of providing care.

6. In a national dental care program, records of a standard type be developed and used in order to permit comparative evaluation of findings and results.

7. When services cannot be supplied to all, children entering their first year in school each year be given priority, and that

maintenance care be continued thereafter for these children from year to year.

8. Studies be undertaken to explore the use and training of auxiliary personnel.

9. In order to insure quality of service and care, adequate remuneration to be provided for personnel.

10. Provision be made for extension of training in dentistry for children in professional schools, clinics, hospitals and health centers.

11. Information be provided to dentists returning from service on the possibility of receiving training in dentistry for children under the GI Bill.

12. The Children's Bureau explore the possibility of harmonizing the periods of training provided under federal funds with periods of training in the centers giving such training.

13. Appropriate measures be taken to integrate the services of physicians, nurses, public health personnel, educators and others in allied professions, directed toward the betterment of dental health for the child.

14. Funds be made available to permit the Children's Bureau to employ dental consultants to assist in the development and maintenance of the dental phase of its activities.

15. The committee instruct Dr. Morrey to ask the Committee on Legislation of the American Dental Association to assist the Children's Bureau in securing funds to implement the proposed dental program.

NATIONAL NEGRO HEALTH WEEK TO BE HELD APRIL 1-8

The thirty-first annual observance of National Negro Health Week will be held April 1-8. The week's program, which has as its objective "A Healthy Family in a Healthy Home," will be under the auspices of the National Negro Health Movement aided by the U. S. Public Health Service. Millard R. Dean, National Dental Association, is a member of the committee. Further information can be obtained from the National Health Week Committee, U.S. Public Health Service, Washington 14, D. C.

PUBLIC HEALTH SERVICE OFFERS HEALTH EDUCATION FELLOWSHIPS

Fellowships for graduate work in health education are being offered to qualified applicants by the U. S. Public Health Service, in cooperation with the National Foundation for Infantile Paralysis, Surg. Gen. Thomas Parran has announced. These fellowships for the collegiate fall term of 1945 are being awarded to meet present and future needs for trained health educators in schools, in communities and in local, state and federal health departments.

Men and women between the ages of 22 and 40 who are citizens of the United States and who hold a bachelor's degree from a recognized college or university may apply.

Fellowships will lead to a master's degree in public health. The twelve months' training period will consist of nine months in the School of Public Health at the University of North Carolina, Yale University or the University of Michigan, and three months' field experience in community health education under supervision. Applicants must meet the requirements for admission to the schools of public health. Training in science, sociology, education and psychology, plus experience in working with people, is a desirable prerequisite.

The fellowships provide a stipend of $100 a month for twelve months, full tuition and travel funds for field experience.

Candidates must pay their travel expenses to and from the university at the beginning and end of training.

Fellowship application forms can be obtained from the Surgeon General, U. S. Public Health Service, Washington 14, D. C. Applications must be accompanied by a transcript of college credits and a small photograph, and must be in the office of the Surgeon General not later than June 1.

COMMITTEE ON LEGISLATION

NEW NAVY DENTAL CORPS BILL IN HOUSE AND SENATE

A new bill to provide "more efficient dental care for the personnel of the U. S. Navy" has been introduced into the Senate and House of Representatives. S. 715 was introduced March 8 by Sen. David I. Walsh, Massachusetts, chairman of the Committee on Naval Affairs. H.R. 2584 was introduced in the House by Rep. L. Mendel Rivers, South Carolina, who was the sponsor of a similar bill in the last session of Congress.

NEW FEDERAL BILLS OF DENTAL INTEREST

The following bills of dental interest have been introduced into Congress and have been reported by the Committee on Legislation, George H. Fox, secretary.

H. R. 1704, introduced by Representative Sparkman, Alabama, provided for the appointment of female dentists in the Dental Corps of the Army and Navy. (Referred to the Committee on Military Affairs.)

H. R. 1999, introduced by Representative King, California, proposes to establish a joint committee to select a suitable medal or award to be bestowed on members of local Selective Service boards.

H. R. 2045, introduced by Representative Hartley, New Jersey, proposes an appropriation of $25,000,000 for the fiscal year beginning July 1, 1945 to aid the several states and territories in providing a program of physical fitness, to be promoted by the U. S. Commission for the Promotion of Physical Fitness, to be created by this bill.

H. R. 2253, introduced by Representative Priest, Illinois, proposed to establish in the Veterans Administration a commissioned service consisting of physicians, surgeons, dentists, dietitians, nurses and medical technicians.

COUNCIL ON DENTAL HEALTH

COUNCIL ISSUES DENTAL CARE PLAN FOR LOW INCOME GROUPS

A guide to component dental societies for the establishment of community dental service programs for low income groups has been issued in pamphlet form by the Council on Dental Health of the American Dental Association. The pamphlet will be furnished on request to the Council on Dental Health, American Dental Association, 222 E. Superior St., Chicago 11, Ill.

"Neither funds nor personnel are available for complete treatment programs for the American people," the pamphlet states, and "realism demands that in planning for community dental programs we should consider policies and procedures that will achieve the greatest good with the facilities at hand." Recommendations are made in the pamphlet for the establishment of dental treatment programs for both children and adults.

Of particular interest in the pamphlet is the definition of "minimum standards of dental service for children." These standards, which were developed by the American Society of Dentistry for Children, recommend treatment programs for three age groups. Other sections of the pamphlet deal with costs, sources of funds, professional policies, selection of patients, methods of providing treatment, administration of dental treatment programs, routine of treatment, eligibility, records and reports and responsibilities in treatment programs.

THE WAR

LIEUTENANT MANSON RETURNS AFTER THREE YEARS IN JAP PRISON CAMP

Lt. Emmet L. Manson, rescued from the Jap prison camp at Cabanatuan in the Philippines, was among the first Bataan heroes to reach this country after three years as a prisoner of war. Lieutenant Manson, who arrived in San Francisco February 21, is now spending his leave at home in Worthington, Minn., in an effort to recover the large amount of weight lost during the ordeal. He is also visiting with his 5-year-old son whom he had not seen since the boy was 11 months old.

Lieutenant Manson was assigned to duty in the Philippines in May 1941. When Olangape fell to the Japanese, he was evacuated to Corregidor. Dr. Manson, who was graduated from the University of Minnesota in 1933, also served as a major in the first world war.

FREED FROM CABANATUAN PRISON CAMP

Three American Naval officers, captured by the Japs on Bataan, were recently released from the Cabanatuan prison camp by a daring raid of the American Rangers. Lt. Emmet L. Manson, Worthington, Minn. (right) was one of the dental officers to be released. He is shown at a press conference after his arrival in San Francisco.

DENTAL CHIEFS OF ALLIED FORCES MEET IN PARIS

American, British and Canadian dental chiefs recently met in Paris to discuss mutual problems regarding the dental care of Allied troops on the Continent.

Col. Thomas L. Smith, of Red Level, Ala., chief of the Dental Division in the European Theater of Operations and Col. Harold Higgins, deputy director of Dental Service, Canadian Army, 21st Army Group, visited the U. S. Army Paris Dental Clinic and the Central Dental Laboratory No. 2.

The visiting dental chiefs were favorably impressed with the modern and complete facilities of the dental clinic, which are made available to Allied troops stationed in the Paris area or in the city on leave.

Procedures and methods of treatment were discussed with Colonel Smith and Lt. Col. William B. Ryder, San Francisco, Calif., who is in charge of the clinic, and Lt. Col. Lynne C. Dirksen, Iowa City, Iowa, who heads the laboratory.

Arrangements were made for mutual cooperation in areas where there is only one representative dental facility.

CONTINUE DENTAL PERSONNEL IN "CRITICAL" LISTING

Dentists and the personnel of dental offices and laboratories have been continued in the "critical and essential" categories under a recent ruling of the War Manpower Commission. The new classification was made to facilitate the drafting of 200,000 industrially deferred men in the 26-29 age category. The list will guide local draft boards on occupational deferments and will govern the order in which men will be called.

CURRENT LITERATURE

Eruption of the Deciduous Teeth. By Henry C. Sandler.

The eruption of the deciduous teeth was studied in 1,962 white children of fairly low economic status, but under regular nutritional and medical supervision in a well-baby clinic. No deciduous teeth had erupted in children under 4 months of age and all the deciduous teeth had erupted in children over 34 months of age. From the earliest to the latest, the usual order of eruption was: lower central incisor, upper central incisor, upper lateral incisor, lower lateral incisor, first molars (upper or lower), cuspids (upper or lower) and second molars (upper or lower). No characteristic difference was found between boys and girls as to the ages at which specific teeth erupt or with respect to the number of teeth expected to be present at any age. The relationship between variations in the weight of the child in any age group and the rapidity of tooth eruption was small and not statistically significant.—*J. Pediat.*, 25:140, August 1944.

General Analgesic Effects of Procaine By N. Bigelow and I. Harrison.

It has been observed that administration of procaine, as that of cocaine, may produce general analgesia. A series of experiments were performed to study the general analgesic properties of procaine.

Two per cent solutions of procaine hydrochloride, in dosages varying from 5 to 40 cc., were injected subcutaneously into the forearm of the subjects and pain threshold determinations were made on the forehead. Control threshold measurements were made prior to each injection and at approximately ten-minute intervals thereafter until the threshold returned to normal. In order to eliminate the factor of suggestion, control studies were made by using placebos or blanks under conditions such that neither the experimenter nor the subject knew that a placebo was being used.

The results showed that the maximum rise in the cutaneous pain threshold attributable to the general action of procaine after from 100 to 800 mg. was injected subcutaneously was approximately equivalent to the ceiling rise observed after administration of acetylsalicylic acid: namely, about 35 per cent of the normal threshold value. The effect of the procaine was, however, much shorter than that of acetylsalicylic acid. The general analgesic effect of procaine administration was usually more pronounced when other central effects of the drug therapy, such as sensations of lightheadedness, giddiness or faintness and nausea, were also evident. The control injection of physiologic sodium chloride solutions was also associated with a rise in the pain threshold, which, on the average, was not so great as nor so prolonged as that observed after the smallest dose of procaine employed.

The local anesthetic action of procaine was also tested by producing a perineural block of the ulnar nerve. The local action was found to outlast the general analgesic action by about one hour.

When the subjects were submitted to the tests on different occasions, variations were observed in the general analgesic effect on different occasions in the same subject independently of the dosage.—*J. Pharm. & Exper. Therap.*, 81:368, August 1944.

Some Epithelial Changes in Flurosis. By Leo Spira.

It has been established that the skin and its appendages, the teeth, nails and hair are affected by the presence of flourine. The present paper discusses the result of clinical observation on the action of fluorine upon other tissues of ectodermal origin. Specifically, the tissues under discussion are the lining of the mouth and the epithelium of the salivary and other buccal glands of the nostrils and of the conjunctivae and lachrymal glands. The signs and symptoms produced by fluorine ingestion are seen to resemble those usually attributed primarily to infection. It is suggested that since fluorine acts by reducing the level of the calcium in blood and tissues, the infections accompanying chronic fluorine poisoning is of a secondary nature, and is brought about by the loss of calcium in the body.—*J. Hyg.*, 43:400, September 1944.

Incidence of Dystrophies Caused by Fluorine in Organs Regulated by the Parathyroid Glands. By Leo Spira.

A recent investigation into the symptomatology of chronic fluorine poisoning revealed that organs originating in the ectoderm and regulated by the parathyroid glands, namely the skin and its appendages, the nails, teeth and hair, were affected. The present paper describes the incidence of these lesions as found in a series of 1,700 people taken at random, 850 men and 850 women. They belonged to different spheres of life and came from various parts of the country. Their average age was 25 years.

The study indicated that dystrophies due to chronic fluorine poisoning in organs regulated by the parathyroid glands are unusually common in England. It is the authors' opinion that they should be regarded as easily detectable signs of a serious disturbance of the calcium metabolism of the body. —*J. Hyg.*, 43:402, September 1944.

What the Veterans Want. By Jessie Howard.

This article reports what about 4,000 former students from the University of Illinois want in the way of education when they return. Seventy-one per cent plan to return to school and the predominating request seems to be: "We want a streamlined curriculum which will fit us as rapidly as possible for a job, which we would like the university to find for us, and since over half of us are married, we need low-cost accommodations for our families." Many physicians, dentists and engineers say that they have had little or no chance to employ their skill in several years and need the short, intensive refresher courses. The men are lavish in their praise of Army and Navy teaching methods, particularly their use of visual aids, and they hope that the universities will employ many of the same methods. It is apparently not true that the veterans are tired of being tested, for they are eager to have the schools test the incoming students for aptitude and to give them guidance and counsel in selecting vocations.—*J. Higher Ed.*, 16:10-16, January 1945.

Treatment of Vincent's Angina With Sulfathiazole. By W. W. Manson and I. T. Craig.

Vincent's angina of the tonsils was treated by dissolving a 0.5 gm. sulfathiazole tablet on the tongue every two hours during the day and two such tablets every four hours during the night. The series reported comprised thirty-six cases, all of which were treated for a maximum of seventy-two hours. The total sulfathiazole dosage was, in each case, 18 gm. The milder cases received only forty-eight hours of treatment and a total of 12 gm. Results were uniformly good in both groups. Symptoms disappeared almost completely and the temperatures were normal after twenty-four hours. Smears taken at this time showed either no Vincent's organisms or a pronounced reduction of the *Borrelia* forms. Lesions were invariably cleared up in ninety-six hours after treatment was started. The average number of sick days was 3.75, which is much shorter than with the older methods of treatment, including the use of neoarsphenamine locally or intravenously. Twelve cases in addition to those reported above have been treated by the method with similar results.—*J.A.M.A.*, 127:277, February 3, 1945.

Stomatitis and Diarrhea of Infants Caused by a Hitherto Unrecognized Virus. By C. J. Buddingh and K. Dodd.

A stomatitis of young infants and children often accompanied by diarrhea was considered an atypical form of herpetic stomatitis, but contact with swabbings from the mouths of affected infants consistently failed to produce herpetic keratitis in the eyes of rabbits. A hitherto unrecognized virus, isolated by inoculation of the scarified rabbit cornea, has been propagated and maintained through forty passages in the eyes of young rabbits. The appearance of neutralizing antibodies in convalescent serum of individuals recovering from the condition demonstrated the specific relation of the virus to the disease. There is evidence that the virus is highly contagious. The stomatitis may occur sporadically in adults and be spread to susceptible infants. Adults may spread the virus when they themselves evidence no infection.—*J. Pediat.*, 25:105, August 1944.

Perleche: Its Nosologic Status. By C. W. Finnerud.

Perlèche, a maceration with transverse fissuring of the oral commissures, has to date been regarded as a disease entity of infectious origin, particularly bacterial (usually streptococcic or staphylococcic), or mycotic (usually monilial). Vitamin deficiencies (especially of riboflavin, nicotinic acid and pyridoxine) have been shown to cause identical cutaneous changes, with or without associated skin, tongue, scleral and systemic manifestations, experimentally and clinically. The same fissuring of the mucocutaneous junction of the lips has also been observed in persons with overclosure, the result of wearing ill-fitting dentures, and in the aged in whom atrophy of the tissues has caused some overhanging of the upper lip at its lateral margins.

From the evidence presented, perlèche should no longer be regarded as a disease entity, but rather as a cutaneous symptom occurring in the form of an intertrigo, analogous to intertrigo elsewhere, of manifold etiology. It is properly classified as infectious perlèche of bacterial or mycotic origin, arising from nutritional, mechanical or idiopathic conditions.—*J.A.M.A.*, 126:737-740, November 18, 1944.

Use of Penicillin Pastilles in Oral Infections. By A. B. MacGregor and V. Long.

Penicillin was incorporated in a gelatin base (containing a small amount of a preservative) in sufficient quantity so that each pastille contained 500 units. It was found to be liberated in the mouth in an active form and in a concentration which could be maintained. The pastilles kept for a period of at least three months without appreciable deterioration or loss of efficiency. The method is simple and the drug is well tolerated, even by children. It was possible to reduce greatly the number of organisms in the mouth and throat and even to produce sterile cultures. During the treatment, the patients were instructed to place a pastille in the buccal sulcus; to let it dissolve without chewing or sucking, and then to replace those dissolved with others.

Twenty-five cases of ulcerative gingivostomatitis (Vincent's type), seventeen cases of acute streptococcal tonsillitis, twelve of chronic streptococcus carriers, three of fractures of the mandible compounded into the mouth, three of difficult dental extractions involving considerable trauma, and three of ulceration of the mucous membrane unassociated with Vincent's organisms and three posttonsillectomy cases have been treated successfully. In the ulcerative gingivostomatitis and the acute streptococcal tonsillitis cases, the patients obtained definite relief after twenty-four hours. Forty-eight hours after treatment, the majority became asymptomatic. The throats of the chronic streptococcus carriers could be kept free of the hemolytic streptococci while pastilles were used, but, in the majority of cases, the organisms returned after treatment was discontinued. On the basis of this small series, it appears that in surgical conditions, the mouth and throat could be kept free of pathogenic organisms, during administration of the pastilles, with marked symptomatic relief.—*Brit. Med. J.*, 2:686-689, November 25, 1944.

Chaetomin, New Antibiotic Substance Produced by Chaetomium Cochliodes. By S. A. Waksman and E. Bugie.

A strain of *Chaetomium cochliodes*, when grown on suitable media, produces an antibiotic substance designated as chaetomin, active principally against gram-positive bacteria. The antibacterial spectra for chaetomin and penicillin are similar, but not identical. Both substances act on gram-positive bacteria, but only slightly on gram-negative organisms. Chaetomin has marked bactericidal properties. *In vivo* tests for toxicity show that it is not very toxic to animals. However, under those conditions, it gave no protection against organisms sensitive to it *in vitro*. The mechanism or agent in the body which inactivates or neutralizes chaetomin remains to be determined.—*J. Bact.*, 48:527, November 1944.

Abstracts by: Paul H. Keyes, S. W. Leung, J. E. Gilda and Shailer Peterson.

DEATHS

ADAMS, ARTHUR STEWART, Huntington, W. Va.; Howard University, College of Dentistry, 1914; died January 4.

ADAMS, CHARLES F., Waterloo, Iowa; died December 21; aged 75.

BARRY, JOHN F., South Manchester, Conn.; Tufts College Dental School, 1919; died January 6; aged 50.

BERCHTOLD, JOSEPH A., Springfield, Mo.; Creighton University, College of Dentistry; died December 16; aged 35.

BLACK, OTIS E., Lawton, Okla.; died November 23; aged 74.

BOOKER, WARREN E., Jamaica, N. Y.; Thomas Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1891; died January 8; aged 80.

BROWN, CHARLES, Providence, R. I.; died January 11; aged 58.

BROWN, ROBERT K., Ann Arbor, Mich.; University of Michigan, College of Dental Surgery, 1919; died March 28, 1944; aged 50.

BUSCH, HAROLD M., New Brunswick, N. J.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1944; died December 31; aged 24.

CAPPS, THOMAS P., Topeka, Kan.; Kansas City-Western Dental College, 1922; reported missing in action November 24, 1943, during Gilbert Islands Invasion, now declared dead by Navy Department. Dr. Capps was a lieutenant in the United States Navy.

CASEY, MATTHIAS H., Somerville, Mass.; Temple University School of Dentistry, 1907; died January 16.

CLARK, JAMES EDWIN, New Wilmington, Pa.; Temple University School of Dentistry, 1892; died January 1.

COCH, ADOLPH, San Antonio, Texas; died December 4; aged 38.

CROWELL, GEORGE W., Utica, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1902; died December 22; aged 67.

CURRIE, FRANK T., Cambridge, Mass.; Harvard University Dental School; died January 10; aged 56.

DE LA CROIX, DENNIS J., Hamilton, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1910; died January 11.

DILLON, THOMAS A., Holyoke, Mass.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennyslvania, 1907; died January 12.

DOBBY, JAMES J., Winthrop, Mass.; Tufts College Dental School, 1941; died January 9; aged 30.

DRAVEL, WILLIAM F., Los Angeles, Calif.; died December 8; aged 55.

EDENBURN, ELMER E., Columbus, Ind.; Ohio Medical University, College of Dentistry, 1896; died January 4; aged 80.

EVERETT, JOY H., Chicago, Ill.; died January 14; aged 43.

FAST, FLETCHER H., Charleston, W. Va.; University of Maryland, School of Dentistry and the Baltimore College of Dental Surgery, 1919; died January 11; aged 55.

FITZGERALD, E. J. Boothbay Harbor, Maine; University of Maryland, School of Dentistry and the Baltimore College of Dental Surgery, 1913; died December 19.

HAGERTY, JAMES, Everly, Iowa; died December 19.

HAYES, IRA PAUL, Sheridan, Wyo.; Northwestern University Dental School, 1902; died January 8; aged 64.

JACKSON, JAMES M., Des Moines, Iowa; Creighton University, College of Dentistry; died December 22; aged 60.

JACKSON, WALTER, Dayton, Ohio; Ohio Medical University, College of Dentistry, 1909; died January 6; aged 66.

JOHNSON, JAMES H., Chehalis, Wash.; North Pacific College of Oregon, School of Dentistry, 1909; died December 7; aged 57.

JONES, JAMES BAIRD, Murfreesboro, Tenn.; Vanderbilt University, School of Dentistry, 1910; died December 19.

KELLERMANN, ERNEST D., Birmingham,

Mich.; died January 14; aged 41.

KIMBERLIN, T. A., Indianapolis, Ind.; Indiana University School of Dentistry, 1897; died January 5; aged 64.

KING, MARY ELIZABETH, Genoa, Ill.; Northwestern University Dental School, 1909; died January 15; aged 58.

KNIGHT, WILLIAM EDWARD, Dayton, Ohio; Cincinnati College of Medicine and Surgery, Dental Department, 1899; died January 13; aged 74.

KOEHLER, ROBERT H., Hollywood, Fla.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1911; died January 2; aged 58.

KROUSE, ALEXANDER PENN, Meridian, Miss.; died December 16; aged 94.

LEIKIN, LON H., Springfield, Mass.; Medico-Chirurgical College of Philadelphia, 1913; died January 14.

MCGLYNN, JAMES T., Brookline, Mass.; Harvard University Dental School, 1910; died December 27; aged 65.

MALLOY, LEO J., Kenmore, N. Y.; died January 1; aged 65.

MANDRA, JOSEPH J., Brooklyn, N. Y.; The School of Dental and Oral Surgery of Columbia University, 1926; died January 17.

MARTIN, FRANK S., Muncie, Ind.; Indiana University, School of Dentistry, 1898; died December 16; aged 71.

MIESSE, OSCAR, Columbus, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1895; died December 27; aged 72.

MUNDWILER, WILLIAM, Pioneer, Ohio; Ohio Medical University, College of Dentistry, 1900; died January 6; aged 67.

NICHOLS, WARREN M., White Plains, N. Y.; died January 2; aged 52.

NICHOLSON, JOHN T., Sandusky, Ohio; Pennsylvania College of Dental Surgery, Philadelphia, 1898; died January 11; aged 77.

NIELSEN, JEAN C., Idaho Falls, Idaho; died December 23; aged 38.

NORCOTT, E. D., Nyssa, Ore.; North Pacific College of Oregon, School of Dentistry, 1927; died December 10; aged 40.

PERRY, WILLIAM W., Helena, Mont.; State University of Iowa, 1892; died January 7; aged 76.

POTTER, FRANKLIN H., Buffalo, N. Y.; University of Buffalo, School of Dentistry, 1908; died January 8; aged 63.

ROBISON, GEORGE S., Danville, Ill.; University of Pittsburgh, School of Dentistry, 1904; died December 24; aged 67.

ROCKETT, JOSEPH B., Newton, Mass.; Tufts College Dental School, 1904; died January 4; aged 62.

ROTHENBERG, EDWARD J., Brighton, Mass.; Marquette University, College of Dentistry; died December 25.

SALISBURY, GEORGE, Asheboro, N. C.; Baltimore College of Dental Surgery, 1905; died December 28; aged 62.

SIMPSON, W. H., Sycamore, Ill.; State University of Iowa, College of Dentistry, 1890; died December 28.

SNOW, FRANCIS T., San Jose, Calif.; San Francisco Dental College, 1902; died December 29; aged 68.

STANTON, FREDERICK L., New York, N. Y.; New York College of Dentistry, 1893; died January 1; aged 71.

STOUP, D. W., Norwalk, Ohio; University of Michigan, College of Dental Surgery, 1897; died January 3; aged 72.

STURDEVANT, H. A., Portland, Ore.; University of Michigan, College of Dental Surgery, 1894; died December 20; aged 74.

TYNES, MATTHEW POWELL, Farmville, Va.; University College of Medicine, Dental Department, Richmond, 1910; died January 10; aged 59.

VARDAMAN, HOMER DOUGLAS, Rosedale, Miss; University of Louisville, School of Dentistry, 1904; died December 18.

VINEZ, LOUIS S., Louisville, Ohio; Western Reserve University, School of Dentistry, 1895; died January 14; aged 77.

WAITES, JESSE CLAY, Birmingham, Ala.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1910; died January 4.

WARFORD, HARRY N., Darby, Pa.; Temple University School of Dentistry, 1908; died January 3.

WIDMAN, RUDOLPH, Webster Groves, Mo.; Washington University School of Dentistry, 1897; died December 30; aged 68.

WOOD, HARRY T., Idaho Falls, Idaho; died in December; aged 55.

YALE, GEORGE W., Hartford, Conn.; Tufts College Dental School, 1895; died January 1.

CALENDAR OF MEETINGS

National

American Association of Industrial Dentists, Chicago, April 23-28. Ernest Goldhorn, 11001 S. Cottage Grove Ave., Chicago 28, President. (Canceled.)

American Association of Orthodontists, Colorado Springs, May 21-24. Max E. Ernst, 1250 Lowry Medical Arts Bldg., St. Paul 2, Secretary. (Canceled.)

American Board of Orthodontics, Colorado Springs, May 17-20. Bernard G. de Vries, 705 Medical Arts Bldg., Minneapolis, Secretary. (Canceled.)

National Board of Dental Examiners, April 23-24, in schools where there are five or more candidates. Gordon L. Teall, P. O. Box 71, Hiawatha, Kan., Secretary.

Ontario Dental Association, Toronto, May 28-30. E. A. Grant, 86 Bloor St. West, Toronto 5, Ontario, Secretary.

State

Colorado: State Board of Dental Examiners, Denver, June 18-22. Harry D. Stanwood, Republic Bldg., Denver 2, Secretary.

Connecticut: State Dental Association, Bridgeport, May 2-4. Earle S. Arnold, Secretary. (Canceled.)

Delaware: State Board of Dental Examiners, June 20-22. Charles R. Jefferis, Medical Arts Bldg., Wilmington, Secretary.

District of Columbia: Dental Society, Washington, second Tuesday of each month. J. Walter Bernhard, 1835 Eye St., N.W., Washington, Secretary.

Florida: State Board of Dental Examiners, Jacksonville, June 18-21. A. W. Kellner, P. O. Box 155, Hollywood, Secretary.

Illinois: State Dental Society, Peoria, May 7-10. L. H. Jacob, Jefferson Bldg., Peoria 2, Secretary.

Iowa: State Board of Dental Examiners, Iowa City, June 11-15. Harry G. Bolks, Sioux City, Secretary.

State Dental Society, Des Moines, May 7-9. A. N. Humiston, Higley Bldg., Cedar Rapids, Secretary. (Canceled.)

Kentucky: State Board of Dental Examiners, Louisville, June 19-22. W. F. Waltz, First National Bank Bldg., Lexington 3, Secretary.

State Dental Association, Louisville, April 2-4. J. L. Walker, 640 Barbee Way South, Louisville, Secretary.

Louisiana: State Dental Society, New Orleans, April 24-26. F. Harold Wirth, Maison Blanche Bldg., New Orleans 16, General Chairman.

Maine: Board of Dental Examiners of State of, Augusta, June 18-20. Carl W. Maxfield, 31 Central St., Bangor, Secretary.

Dental Society, Portland, June 14-16. Alonzo H. Garcelon, Division of Dental Health, Augusta, Secretary.

Maryland: State Dental Association, Baltimore, May 7-8. Paul A. Deems, 835 Park Ave., Baltimore 1, Secretary.

Massachusetts: Dental Society, Boston, April 30-May 3. Evelyn F. Eaton, 106 Marlborough St., Boston, Executive Secretary. (Canceled.)

Michigan: State Dental Society, Detroit, April 16-18. S. G. Applegate, 630 Jefferson Ave., Detroit, General Chairman.

Mississippi: Dental Association, Jackson, May 6-8. O. L. Colee, Magnolia, Secretary.

Missouri: State Dental Society, St. Louis, May 14-16. C. W. Diggs, Exchange National Bank Bldg., Columbia. (Canceled.)

New Jersey: State Board of Registration and Examination in Dentistry, April 23-26. J. Frank Burke, 150 State St., Trenton, Acting Secretary.

State Dental Society, Atlantic City, May 8-11. F. K. Heazelton, 223 E. Hanover St., Trenton, Secretary. (Canceled.)

New York: Institute of Clinical Oral Pathology, Inc., New York, April 30. G. Roistacher, 101 E. 79th St., New York 21, Executive Secretary.

North Carolina: Dental Society, Pinehurst, May 7-9. C. W. Sanders, Benson, Secretary. (Canceled.)

State Board of Dental Examiners, Raleigh, June 25. Wilbert Jackson, Rich Bldg., Clinton, Secretary.

North Dakota: State Board of Dental Examiners, Fargo, July 9-12. Richard Krause, Bismarck, Secretary.

Ohio: Cleveland Dental Society, May 7-9. Homer C. Alexander, Windermere Theatre Bldg., East Cleveland, Program Chairman.

State Dental Board, Cleveland, May 21-23; Columbus, June 4-6, 7-9. Hygienists, June 5, 7-9. Earl D. Lowry, 79 E. State St., Columbus, Secretary.

Oklahoma: State Dental Society, Oklahoma City, April 15-18. E. W. Wise, Secretary. (Canceled.)

Pennsylvania: Dental Council and Examining Board of Commonwealth of, Philadelphia, April 16-21; May 28-June 2. Hygienists, May 28-31. Reuben E. V. Miller, Dept. Public Instruction, Bur. Professional Licensing, Harrisburg, Secretary.

State Dental Society, Philadelphia, May 1-3. C. J. Hollister, 217 State St., Harrisburg, Executive Secretary. (Canceled.)

South Carolina: State Dental Association, Columbia, April 22-24. C. M. Douglas, State Hospital, Columbia, President. (Canceled.)

South Dakota: State Dental Society, Waterton, May 13-15. Ernest W. Elmen, Sioux Falls, Secretary.

Tennessee: Board of Dental Examiners, Memphis, June 18-22. James J. Vaughn, Medical Arts Bldg., Nashville, Secretary.

State Dental Association, Knoxville, May 14-17. E. Jeff Justis, Exchange Bldg., Memphis 3, Secretary.

Vermont: State Board of Dental Examiners, Montpelier, June 25-27. Charles I. Taggart, 139 Bank St., Burlington, Secretary.

State Dental Society, Burlington, May 23-24.

Virginia: State Dental Association, Roanoke, April 23-25. J. E. John, Medical Arts Bldg., Roanoke, Secretary.

State Board of Dental Examiners, Richmond, June 19. John M. Hughes, Medical Arts Bldg., Richmond 19, Secretary.

Washington: State Dental Association, Spokane, June 21-23. G. D. Williams, Paulsen Bldg., Spokane, President.

West Virginia: State Board of Dental Examiners, West Liberty, June 25-27. R. H. Davis, Goff Bldg., Clarksburg, Secretary.

State Dental Society, Charleston, May 21-23. M. H. Nicholson, Bluefield, Secretary.

Wisconsin: State Dental Society, March 19-21. (Canceled.)

INTERNSHIPS, EXTERNSHIPS, RESIDENCIES AND FELLOWSHIPS

California, University of, Research Assistant, July 1. Willard C. Fleming, College of Dentistry, Medical Center, San Francisco 22, Dean.

Eastman Dental Dispensary, Rochester, N. Y. Director, Harvey J. Burkhardt.

Greater New York Conference of Hospital Dental Services. Secretary, Mary E. Reilly, 386 Fourth Ave., New York.

Research and Educational Hospital, University of Illinois Medical Center. Address Dean, University of Illinois, College of Dentistry, 808 S. Wood St., Chicago 12.

Walter G. Zoller Memorial Dental Clinic, University of Chicago. Address Director, Walter G. Zoller, Memorial Dental Clinic, University of Chicago, Chicago 37.

Pathology, Dental and Oral, Fellowship in, Army Institute of Pathology. Address Director, American Registry of Pathology, Army Institute of Pathology, Army Medical Museum, 7th and Independence, S.W., Washington 25, D. C.

Research Fellowships in Medicine, Dentistry and Pharmacy, University of Illinois. Address Secretary of Committee on Graduate Work in Medicine, Dentistry and Pharmacy, 1853 W. Polk St., Chicago 12.

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PERIODONTIA: Hunter S. Allen, Comer Bldg., Birmingham, Ala.
DENTISTRY FOR CHILDREN AND ORAL HYGIENE: Kenneth A. Easlick, University of Michigan, Ann Arbor, Mich.
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HOSPITAL DENTAL SERVICE: W. Harry Archer, Professional Bldg., Pittsburgh, Pa.

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